Chemical Quality Assurance Report

Groundwater Investigations

Plum Brook Ordnance Works

Sandusky, Ohio

Prepared for the Shaw Group

By

DataChek

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Chemical Quality Assurance Report Groundwater Investigations Plum Brook Ordnance Works, Sandusky, Ohio

1.0 Executive Summary

The purpose of the Chemical Quality Assurance Report (CQAR) is to provide a comprehensive review of the quality of the chemical data associated with the project investigation for the Plum Brook Ordnance Works. The former PBOW site is currently owned by NASA and is operated as the Plum Brook Station (PBS) of the NASA John Glenn Research Center, which is located at Lewis Field based in Cleveland, Ohio. It is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland. The areas surrounding PBOW are mostly agricultural and residential. Public access is restricted at PBOW except during the annual deer hunting season.

The PBOW site was built in early 1941 as a manufacturing plant for 2,4,6-TNT, dinitrotoluene (DNT), and pentolite. Production of explosives began on December 16, 1941 and continued until 1945. It is estimated that more than one billion pounds of explosives were manufactured during the 4-year operating period. Decontamination of TNT, acid, pentolite, and DNT processing lines was completed in late 1945.

Based on review of historical use of the site and findings of previous investigations, potential contaminants in the groundwater at PBOW may include nitroaromatic compounds, volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and metals. The analytical objective of the groundwater investigation is to produce data of known quality that can be used for several purposes. The data will be used to determine if hazardous substances are present at the site at concentrations that may constitute unacceptable risk to human health or the environment, determine the nature and extent of source areas, and determine whether contaminant distribution is consistent with DOD activities.

The CQAR for the Plum Brook Ordnance Works (PBOW) groundwater program has been prepared using a single set of a project sample, field quality assurance (QA) sample (field duplicate) and quality control (QC) sample (field split). Samples used in the preparation of the QCAR are listed in Table 1. The analyte groups and analytical methods are provided below:

Parameter (Method)
Volatile Organics by GC/MS SW846 8260B
Explosives by SW846, 8330
Semivolatile Organics by SW846 8270C
Metals by SW846 6010B, 7470A

Table 1: Samples Used in Preparation of the CQAR

LOCATION	SAMPLE NO	SAMPLE DATE	PURPOSE	SDG	ANALYTICAL LAB
PBOW	CD3005	17-Oct-02	REG	H2J180210	STL
	CD3006		FD	H2J180210	STL
	CD3007		FS	F15100	Accutest

Two laboratories provided the analysis of the project samples and the associated laboratory QA/QC used in arriving at the results. Severn Trent Services (STL), Knoxville, TN analyzed both the project sample and the field QA sample (field duplicate), and Accutest Laboratories, Orlando, Florida analyzed the field QC sample (field split).

Sensitivity: In the case of CD3006, the sample pH exceeded 2.0. Since the sample was analyzed beyond seven days, toluene, benzene and ethyl benzene were considered to be bias low. All three compounds were qualified as "UJ/J".

Precision: The variability between the project sample, field QA and field QC are summarized in Tables 2-5. The criteria for comparing the project samples and the QA/QC samples conforms to the levels defined in Table 6. A total of 26 comparisons were made and three (10.5%) of the sample pairs were designated as disagreement and five (19.2%) as major disagreement. Four of the sample results with major disagreement resulted from comparing samples with detects to samples with no detects.

Accuracy: The analyte groups may contain false positives or be biased high because of method and/or trip blank contamination. In the volatiles, methylene chloride, a common laboratory contaminant, was the only blank contaminant found also in the field QA sample. In the metals, thallium and zinc were in the method blank and were present in the project and field QA samples.

Completeness: No data were rejected

Comparability: All of the analytical laboratories used the same method to analyze the samples. As a result all sample data can accurately be compared and analyzed.

2.0 Review of Project Samples, Field QA Samples, & Field QC Samples

The sample data were evaluated following the logic identified in *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (February 1994) and *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (October 1999). Blank evaluation followed USEPA *Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (*April 1993) and *Region III Modifications to National Functional Guidelines for Organic Data Review, Multi-Media, Multi-Concentration* (September 1994). Overall, the quality of the data was determined to be acceptable. Acceptable results were qualified as appropriate.

Several sample results for the organic compounds were assigned "J" qualifiers by the laboratory, which is standard practice for these methods, because they were quantitated between the method detection limit (MDL) and the reporting limit (RL). Due to the uncertainty associated with this region of quantitation, the validation reviewer retained the "J" qualifiers assigned by the laboratory to indicate an estimated quantity.

Data validation summaries (Attachment 1), which function as worksheets for the validation task, are included for each parameter in each data package. The following section highlights the key findings of the data validation for each analysis.

2.1 Analysis-Specific Data Validation Summaries

2.1.1 Volatile Organics by SW846 8260B

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times/Sample Condition. Sample CD3006 had not been preserved in the field and the pH was >2.0. The analysis was performed within the QC holding time limit for unpreserved samples; however, benzene, toluene and ethylbenzene are thought to be impacted by biological degradation and as such were considered bias low. Benzene was qualified as "J" and the other two compounds as "UJ".

Initial Calibration (ICAL) and Continuing Calibration (CCAL). All initial and continuing calibrations associated with the project sample met QC criteria, with the exception of the following:

- The following exhibited individual ICAL RRFs below the 0.05 limit or CCAL %D above the 20% QC limit. The CCAL non-detect results were qualified as "UJ".

Sample Type	Samples Affected	Analyte / Analytes	Validation Qualifier
Field QC	CD3007	4-methyl-2-pentanone, 2-hexanone, bromoform	UJ

Blanks. The 5X/10X rule for contaminants found in the associated method blanks (MB) and trip blanks (TB) was applied to all sample results. All were found to be within the5x/10x limits, except for the following:

Sample Type	Samples Affected	Analyte/Analytes	Blank	Validation Qualifier
Field QA	CD3006	methylene chloride	TB	B

Surrogate Recoveries. All surrogate recoveries were within the laboratory QC limits. No qualifiers were required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD). The MS/MSD analyses were performed and all results were acceptable. Some compounds in the SDG associated with field QC sample CD3007 had high recoveries but all sample results were nondetects and therefore the potentially high bias did not affect the sample results. Also, ethyl benzene and xylene had low MSD recoveries, but the MS recovery and LCS were within limits so no qualifiers were required.

Laboratory Control Sample (LCS). LCS analyses were performed and QC criteria were met.

Internal Standards (IS). All internal standards area count recovery and retention times were met.

Quantitation. All results were reported as qualified.

2.1.2 Explosives by SW846-8330

Overall, the data are of good quality. Data were reviewed for the following:

Holding Times/Sample Condition. Technical holding time criteria were met for all samples. Samples were acceptable as received.

Initial and Continuing Calibration. All initial and continuing calibration relative response factors (RRFs) associated with the project sample met QC criteria. No qualifiers were required.

Blanks. No contaminants were found in the associated method blanks.

Surrogate Recoveries. All surrogate recoveries were within laboratory QC limits.

Matrix Spike/Matrix Spike Duplicates (MS/MSD). The MS/MSD analyses associated with the project sample CD3005, and field QA sample CD3006 had a low tetryl recovery, but the LCS results were within limits and no qualifiers were required.

Laboratory Control Sample (LCS). The explosives recoveries in the LCS analyses were within the QC limits and no qualifiers were required.

Quantitation. The sample results were acceptable as reported.

2.1.3 Semivolatile Organics by SW846 8270C

Overall, the data are of good quality with the exceptions noted below. Data were reviewed for the following:

Holding Times/Sample Condition. Technical holding time criteria were met for all samples.

Initial and Continuing Calibration. All initial and continuing calibration RRFs associated with the project sample met QC criteria. No compound results were rejected.

Blanks. No compounds were detected in the method blanks. No qualifiers were required.

Surrogate Recoveries. All surrogate recoveries are within the laboratory QC limits.

Matrix Spike/Matrix Spike Duplicate (MS/MSD). The MS/MSD analyses were acceptable within QC limits.

Laboratory Control Sample (LCS). LCS analyses were performed and all results were acceptable.

Internal Standards (IS). Internal standards analyses were within the +100, -50% laboratory criteria.

Quantitation. All results were nondetects.

2.1.4 Metals (Total and Dissolved) by SW846 6010B; Hg by Cold Vapor 7470A

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times/Sample Condition. Technical holding time criteria were met for all samples.

Initial and Continuing Calibrations. All initial and continuing calibrations associated with the project sample met QC criteria.

Blanks. The 5X rule for contaminants found in the associated calibration, prep, and method blanks (MB) was applied to all sample results. All were acceptable except the following:

Sample Type	Samples Affected	Analyte/Analytes	Blank	Validation Qualifier
Project Sample	CD3005D	zinc	MB	B
Field QA	CD3006T, CD3006D	thallium	MB	B
	CD3006D	zinc	MB	B

Matrix Spike/Matrix Spike Duplicate(MS/MSD). The MS/MSD recoveries were within the QC limits.

ICP Check Samples. The recoveries for the check samples were within the QC limits. No qualifiers were required.

Laboratory Control Sample (LCS). All the LCS had recoveries that met the QC limits. No qualifiers were required.

ICP Serial Dilutions. The serial dilution results were within the QC limits except for the following:

Sample Type	Samples Affected	Analyte / Analytes	Validation Qualifier
Project Sample	CD3005T, CD3005D	potassium	J
Field QA	CD3006T, CD3006D	potassium	J
Field QC	CD3007T, CD3007D	potassium	J

Quantitation. Results quantified between the minimum detection limit (MDL) and the reporting limit (RL), which the lab qualified as "B", were qualified as estimated "J" unless blank contamination was present.

3.0 Review of Sample Handling

All aspects of sample handling were reviewed as part of the sample data evaluation and recorded in each analysis-specific data validation summary. All chain of custody (COC) forms are available in Attachment 2. No major deficiencies were noted in the handling of the samples. In one instance no preservatives were added to the field sample during field collection: sample CD3006 volatiles was received at a pH > 2.0 so the results for benzene, toluene and ethylbenzene were considered to be bias low due to possible biodegradation. All cooler temperatures were plainly identified as within the QC limit.

4.0 Data Comparison Tables

Attachment 3 contains the complete project data set used to create the Comparison Tables. The data set lists all the appropriate samples, concentration units, detection limits, quantitation limits, and in the case of the metals, whether or not the sample was filtered. The detected compounds or elements were used to compare the project sample with the field QA and field QC samples.

All the detected analyte results are shown in Tables 2 through 5. In order to compare the project sample with both the field QA and field QC, compounds or elements detected in the project sample were listed for the corresponding samples as well, whether or not detected. Comparisons of results were categorized by agreement, disagreement or major disagreement as defined in Table 6. In some cases the comparison was labeled as a disagreement or major disagreement when the detect had been qualified as "B" (present in the method or trip blank). Since these compounds or elements may be biased high or a false positive, the comparison result could be overstated.

Data comparisons were appropriate in 26 cases where at least one of the compounds or elements was present in one of the three samples. Application of the comparison criteria resulted in five major disagreements and three disagreements. Virtually all the major disagreements involved a situation where the compound was detected in one sample at levels below the reporting limit (qualified as "J") and in one of the corresponding samples at below the detection level (qualified as "U"). The volatiles had five cases where the disagreement criteria was applied. Three of those involved compounds where one value was a nondetect and two where all three samples had a detected result. The methylene chloride results were agreeable between the project sample and the field QA (FD) sample as well as between the PS and the field QC (FS). The acetone, benzene and xylene results were in major disagreement between the PS and FS. A disagreement was noted for the carbon disulfide results between the PS and FD.

The only comparison for the explosives was for nitrobenzene and the comparisons were in agreement for the PS/FD and PS/FS pairs.

The semivolatiles had no comparisons. All compounds were nondetect in all three samples

Of the 20 instances where the comparison criteria was applied to the metals results, six involved comparisons where one value was a nondetect, and 14 where all values were detects. Two cases were categorized as major disagreements and two as disagreements. All project samples and field QA comparisons were acceptable. All the disagreements and major disagreements were between the project sample and field QC sample.

Table 2. Data Comparison: Volatiles

Location Code	Detected Analyte[1]	Project Sample		Field Duplicate		Field Split		PS/FD[3]	PS/FS[3]
		Sample No/ Date Result/Qual/Code[2]		Sample No./Date Result/Qual/Code[2]		Sample No./Date Result/Qual/Code[2]			
PBOW		CD3005 17-Oct-02		CD3006 17-Oct-02		CD3007 17-Oct-02			
	Acetone	1.6	J	2.6	J	7.3		A	MD
	Benzene	0.15	J	0.14	J, 1a	1.0	U	A	MD
	Carbon disulfide	1.3		0.49	J	1.8		D	A
	Methylene Chloride	2.0	U	0.67	B, 6d	2.0	U	A	A
	Xylenes, total	0.37	J	0.35	J	6.0	U	A	MD

Table 3: Data Comparison: Explosives

Location Code	Detected Analyte[1]	Project Sample		Field Duplicate		Field Split		PS/FD[3]	PS/FS[3]
		Sample No/ Date/ Result/Qual/Code[2]		Sample No./Date/ Result/Qual/Code[2]		Sample No./Date/ Result/Qual/Code[2]			
PBOW		CD3005 17-Oct-02		CD3006 17-Oct-02		CD3007 17-Oct-02			
	Nitrobenzene	0.12	J	0.14	J	0.19	J	A	A

Table 4: Data Comparison: Semivolatiles

Location Code	Detected Analyte[1]	Project Sample	Field Duplicate	Field Split	PS/FD[3]	PS/FS[3]
		Sample No/ Date/ Result/Qual/Code[2]	Sample No./Date/ Result/Qual/Code[2]	Sample No./Date/ Result/Qual/Code[2]		
PBOW		CD3005 17-Oct-02	CD3006 17-Oct-02	CD3007 17-Oct-02		
	No detected compounds					

Table 5: Data Comparisons: Metals

Location Code Detected Analyte[1]		Project Sample		Field Duplicate		Field Split		PS/FD[3]	PS/FS[3]
		Sample No/ Date Result/Qual/Code[2]		Sample No./Date Result/Qual/Code[2]		Sample No./Date Result/Qual/Code[2]			
PBOW (H2J180210)		**CD3005** 17-Oct-02		**CD3006** 17-Oct-02		**CD3007** 17-Oct-02			
	Aluminum Total	79.7	J	80.1	J	200	U	A	A
	Aluminum Dissolved	69.8	J	82.3	J	200	U	A	A
	Barium T	277		275		271		A	A
	Barium D	270		279		281		A	A
	Calcium T	200000		198000		195000		A	A
	Calcium D	198000		202000		201000		A	A
	Iron T	207		203		474		A	D
	Iron D	157		147		432		A	D
	Magnesium T	80200		79500		78500		A	A
	Magnesium D	78600		80500		80800		A	A
	Manganese T	86.5		85.2		82.7		A	A
	Manganese D	84.2		85.6		85.1		A	A
	Potassium T	16200	J,13	15900	J,13	21600		A	A
	Potassium D	15900	J,13	16200	J,13	22100		A	A
	Sodium T	187000		183000		203000		A	A
	Sodium D	180000		183000		209000		A	A
	Thallium T	10	U	4.8	B,6a	10	U	A	A
	Thallium D	10	U	3.9	B,6a	10	U	A	A
	Zinc T	1.7		1.9		20	U	A	MD
	Zinc D	155	B,6a	1.2	B,6a	20	U	A	MD

Footnotes in Tables 2, 3, 4, and 5

1) Nondetected analyte results are provided in the Table for the purpose of establishing the basis for reporting the level of disagreement between the project and QA/QC samples. All results are reported in ug/l.
2) Result/Qual/Code: The Qual notation refers to the evaluator's qualifier added to the analytical value resulting from a review of the lab QA/QC data. See **Table 7** for qualifier definitions. See **Table 8** for a listing of data validation codes.
3) Agreement (A)/Disagreement (D)/major disagreement (MD)-- the level of disagreement is based on comparison criteria from **Table 6**: PS=project sample; FD=field duplicate; FS=field split.

Table 6: Criteria for Comparing Field QC and QA Sample Data

Matrix	Parameter	Disagreement	Major Disagreement
All	All	>5x difference when one result is < DL	>10x difference when one result is < DL
All	All	>3x difference when one result is < RL	>5x difference when one result is < RL
Water	All except TPH	>2x difference	>3x difference

Reference: CRREL Special Report No. 96-9, "Comparison Criteria for Environmental Chemical Analyses of Split Samples Sent to Different Laboratories – Corps of Engineers Archived Data", Grant, C.G., Jenkins, T.F., and Mudambi, A.R., USACE Cold Regions and Environmental Research Laboratory, Hanover NH, May 1996

Table 7 : Validation Qualifiers

U Not detected. The compound/analyte was analyzed for, but not detected above the associated reporting limit.

J The compound/analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.

B The concentration reported was detected significantly above the levels reported in the associated equipment rinse samples and/or laboratory method and trip blanks. (5X/10X Rule was applied).

R The reported sample results are rejected due to the following:

1. Severe deficiencies in the supporting quality control data.
2. Anomalies noted in the sampling and/or analysis process that could affect the validity of the reported data.
3. The presence or absence of the constituent cannot be verified based on the data provided.
4. To indicate not to use a particular result in the event of a reanalysis.

UJ The compound/analyte was analyzed for, but not detected above the established reporting limit. However, review and evaluation of supporting QC data and/or sampling and analysis process have indicated that the "nondetect" may be inaccurate or imprecise. The nondetect result should be estimated.

Table 8: Data Validation Reason Codes

Reason Code	Definition
01	Sample received outside of 4+/-2 degrees Celsius
01A	Improper sample preservation
02	Holding time exceeded
02A	Extraction
02B	Analysis
03	Instrument performance – outside criteria
03A	BFB
03B	DFTPP
03C	DDT and/or Endrin % breakdown exceeds criteria
03D	Retention time windows
03E	Resolution
04	Initial calibration results outside specified criteria
04A	Compound mean RRF QC criteria not met
04B	Individual % RSD criteria not met
04C	Correlation coefficient >0.995
05	Continuing calibration results outside specified criteria
05A	Compound mean RRF QC criteria not met
05B	Compound % D QC criteria not met
06	Result qualified as a result of the 5x/10x blank correction
06A	Method or preparation blank
06B	ICB or CCB
06C	ER
06D	TB
06E	FB
07	Surrogate recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/Duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	% RPD outside acceptance criteria (precision)
09	Post digestion spike outside criteria (GFAA)
10	Internal standards outside specified control limits
10A	Recovery
10B	Retention time
11	Laboratory control sample recoveries outside specified limits
11A	Recovery
11B	% RPD (if run in duplicate)
12	Interference check standard
13	Serial dilution
14	Tentatively identified compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria is exceeded
18	Percent difference between original and second column exceeds QC criteria
19	Professional judgement was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings

Attachment 1

F15100 Accuttest

SDG: H2J180210 ~~JK~~ STL Project: Plum Brook Ordnance Works - CQAR

Method: Volatiles - 8260B Matrix/No. Samples: Water - 3

Validation Samples: CD3005
CD3006
CD3007

Data Validation Report Summary

		Status Code	Comments
1.	Sample Preservation, Handling, and Transport	X	
2.	Chain of Custody	A	
3.	Holding Times	A	
4.	GC/MS Tune/Inst Perf	A	
5.	Calibrations	X	
6.	Blanks	X	
7.	Blank Spike/LCS	A	
8.	Matrix Spike	A	
9.	Surrogates	A	
10.	Internal Standards	A	
11.	Compound Identification	A	
12.	System Performance	A	
13.	Field QC Samples	A	
14.	Overall Assessment	X	

Status Codes:
A = Acceptable
R = Data Rejected
X = Data acceptable but qualified due to problems

Qualifications: ND

6d • Contamination in the trip blank resulted in a "B" qualifier for methylene chloride in CD3006.

1a • Sample CD3006 had a high pH (>2.0) resulting in a "J" qualifier for benzene and "UJ" for toluene and ethylbenzene.

5b • High %D's in the CCAL resulted in "UJ" qualifiers for bromoform, 2-hexanone, and 4-methyl-2-pentanone.

Significant Findings/Recommendations:

Overall Data Quality:

Acceptable as qualified

Validator's Signature: J. Thomas Kitchings Date: 12/17/2002

Peer Reviewer: [illegible] Date: 12-18-02

SHAW E & I INC

Client Sample ID: CD3005

GC/MS Volatiles

Lot-Sample #...: H2J180210-001 **Work Order #...:** FAA061AE **Matrix.....:** WATER
Date Sampled...: 10/17/02 **Date Received..:** 10/18/02
Prep Date.....: 10/24/02 **Analysis Date..:** 10/24/02
Prep Batch #...: 2297276
Dilution Factor: 1 **Method.....:** SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	Rev Qual
Chloromethane	ND	2.0	ug/L	0.20	U
Bromomethane	ND	2.0	ug/L	0.28	
Vinyl chloride	ND	1.0	ug/L	0.18	
Chloroethane	ND	2.0	ug/L	0.22	
Methylene chloride	ND	2.0	ug/L	0.13	
Acetone	**1.6 J**	**10**	**ug/L**	**1.3**	J
Carbon disulfide	**1.3**	**1.0**	**ug/L**	**0.10**	
1,1-Dichloroethene	ND	1.0	ug/L	0.12	U
1,1-Dichloroethane	ND	1.0	ug/L	0.10	
1,2-Dichloroethene (total)	ND	1.0	ug/L	0.13	
Chloroform	ND	1.0	ug/L	0.10	
1,2-Dichloroethane	ND	1.0	ug/L	0.10	
2-Butanone	ND	5.0	ug/L	0.40	
1,1,1-Trichloroethane	ND	1.0	ug/L	0.12	
Carbon tetrachloride	ND	1.0	ug/L	0.10	
Bromodichloromethane	ND	1.0	ug/L	0.10	
1,2-Dichloropropane	ND	1.0	ug/L	0.10	
cis-1,3-Dichloropropene	ND	1.0	ug/L	0.10	
Trichloroethene	ND	1.0	ug/L	0.10	
Dibromochloromethane	ND	1.0	ug/L	0.22	
1,1,2-Trichloroethane	ND	1.0	ug/L	0.14	
Benzene	**0.15 J**	**1.0**	**ug/L**	**0.10**	J
trans-1,3-Dichloropropene	ND	1.0	ug/L	0.11	U
Bromoform	ND	1.0	ug/L	0.10	
4-Methyl-2-pentanone	ND	5.0	ug/L	0.40	
2-Hexanone	ND	5.0	ug/L	0.40	
Tetrachloroethene	ND	1.0	ug/L	0.15	
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	0.12	
Toluene	ND	1.0	ug/L	0.23	
Chlorobenzene	ND	1.0	ug/L	0.10	
Ethylbenzene	ND	1.0	ug/L	0.13	
Styrene	ND	1.0	ug/L	0.12	
Xylenes (total)	**0.37 J**	**1.0**	**ug/L**	**0.30**	J

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	93	(80 - 120)
1,2-Dichloroethane-d4	107	(77 - 128)
Toluene-d8	107	(80 - 120)
Bromofluorobenzene	120	(72 - 129)

(Continued on next page)

SHAW E & I INC

Client Sample ID: CD3006

GC/MS Volatiles

Lot-Sample #...: H2J180210-004 **Work Order #...:** FAA2A1AC **Matrix.....:** WATER
Date Sampled...: 10/17/02 **Date Received..:** 10/18/02
Prep Date.....: 10/24/02 **Analysis Date..:** 10/24/02
Prep Batch #...: 2297276
Dilution Factor: 1 **Method.....:** SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	Rev Qual	
Chloromethane	ND	2.0	ug/L	0.20	U	
Bromomethane	ND	2.0	ug/L	0.28		
Vinyl chloride	ND	1.0	ug/L	0.18		
Chloroethane	ND	2.0	ug/L	0.22		
Methylene chloride	**0.67 J**	**2.0**	**ug/L**	**0.13**	B	6d
Acetone	**2.6 J**	**10**	**ug/L**	**1.3**	J	
Carbon disulfide	**0.49 J**	**1.0**	**ug/L**	**0.10**	J	
1,1-Dichloroethene	ND	1.0	ug/L	0.12	U	
1,1-Dichloroethane	ND	1.0	ug/L	0.10		
1,2-Dichloroethene (total)	ND	1.0	ug/L	0.13		
Chloroform	ND	1.0	ug/L	0.10		
1,2-Dichloroethane	ND	1.0	ug/L	0.10		
2-Butanone	ND	5.0	ug/L	0.40		
1,1,1-Trichloroethane	ND	1.0	ug/L	0.12		
Carbon tetrachloride	ND	1.0	ug/L	0.10		
Bromodichloromethane	ND	1.0	ug/L	0.10		
1,2-Dichloropropane	ND	1.0	ug/L	0.10		
cis-1,3-Dichloropropene	ND	1.0	ug/L	0.10		
Trichloroethene	ND	1.0	ug/L	0.10		
Dibromochloromethane	ND	1.0	ug/L	0.22		
1,1,2-Trichloroethane	ND	1.0	ug/L	0.14		
Benzene	**0.14 J**	**1.0**	**ug/L**	**0.10**	J	1A
trans-1,3-Dichloropropene	ND	1.0	ug/L	0.11	U	
Bromoform	ND	1.0	ug/L	0.10		
4-Methyl-2-pentanone	ND	5.0	ug/L	0.40		
2-Hexanone	ND	5.0	ug/L	0.40		
Tetrachloroethene	ND	1.0	ug/L	0.15		
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	0.12		
Toluene	ND	1.0	ug/L	0.23	UJ	1A
Chlorobenzene	ND	1.0	ug/L	0.10	U	
Ethylbenzene	ND	1.0	ug/L	0.13	UJ	1A
Styrene	ND	1.0	ug/L	0.12	U	
Xylenes (total)	**0.35 J**	**1.0**	**ug/L**	**0.30**	J	

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	94	(80 - 120)
1,2-Dichloroethane-d4	108	(77 - 128)
Toluene-d8	109	(80 - 120)
Bromofluorobenzene	119	(72 - 129)

(Continued on next page)

Accutest Laboratories

Report of Analysis

Client Sample ID:	CD3007		
Lab Sample ID:	F15100-1	**Date Sampled:**	10/17/02
Matrix:	AQ - Ground Water	**Date Received:**	10/18/02
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	PBOW		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B0012386.D	1	10/30/02	JG	n/a	n/a	VB543
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q	Rev Qual
67-64-1	Acetone	7.3	50	5.0	ug/l	J	J
71-43-2	Benzene	ND	1.0	0.50	ug/l		U
75-27-4	Bromodichloromethane	ND	2.0	0.50	ug/l		U
75-25-2	Bromoform	ND	2.0	0.50	ug/l		UJ 5b
108-90-7	Chlorobenzene	ND	2.0	0.50	ug/l		U
75-00-3	Chloroethane	ND	2.0	1.0	ug/l		↓
67-66-3	Chloroform	ND	2.0	0.50	ug/l		↓
75-15-0	Carbon disulfide	1.8	2.0	1.0	ug/l	J	J
56-23-5	Carbon tetrachloride	ND	2.0	0.50	ug/l		U
75-34-3	1,1-Dichloroethane	ND	2.0	0.50	ug/l		↓
75-35-4	1,1-Dichloroethylene	ND	2.0	0.50	ug/l		↓
107-06-2	1,2-Dichloroethane	ND	2.0	0.50	ug/l		↓
78-87-5	1,2-Dichloropropane	ND	2.0	0.50	ug/l		↓
124-48-1	Dibromochloromethane	ND	2.0	0.40	ug/l		↓
156-59-2	cis-1,2-Dichloroethyl	ND	2.0	0.50	ug/l		↓
10061-01-5	cis-1,3-Dichloroprope	ND	2.0	0.50	ug/l		↓
156-60-5	trans-1,2-Dichloroeth	ND	2.0	0.50	ug/l		↓
10061-02-6	trans-1,3-Dichloropro	ND	2.0	0.50	ug/l		↓
100-41-4	Ethylbenzene	ND	2.0	0.70	ug/l		↓
591-78-6	2-Hexanone	ND	10	2.5	ug/l		UJ 5b
108-10-1	4-Methyl-2-pentanone	ND	10	2.5	ug/l		UJ 5b
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l		U
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l		↓
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l		↓
78-93-3	Methyl ethyl ketone	ND	10	2.5	ug/l		↓
100-42-5	Styrene	ND	2.0	0.50	ug/l		~~UJ 5b~~ U JIK
71-55-6	1,1,1-Trichloroethane	ND	2.0	0.50	ug/l		U
79-34-5	1,1,2,2-Tetrachloroet	ND	2.0	0.50	ug/l		↓
79-00-5	1,1,2-Trichloroethane	ND	2.0	0.50	ug/l		↓
127-18-4	Tetrachloroethylene	ND	2.0	0.50	ug/l		↓
108-88-3	Toluene	ND	2.0	0.50	ug/l		↓
79-01-6	Trichloroethylene	ND	2.0	0.50	ug/l		↓

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated m
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a com

Report of Analysis

Client Sample ID:	CD3007		
Lab Sample ID:	F15100-1	**Date Sampled:**	10/17/02
Matrix:	AQ - Ground Water	**Date Received:**	10/18/02
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	PBOW		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q	Rev Qual
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l		u
1330-20-7	Xylene (total)	ND	6.0	1.0	ug/l		u

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		86-115%
17060-07-0	1,2-Dichloroethane-D4	99%		78-125%
2037-26-5	Toluene-D8	107%		87-113%
460-00-4	4-Bromofluorobenzene	116%		84-117%

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated n
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a con

DATA VALIDATION WORKSHEETS
VOLATILE ORGANICS

Reviewer: Kitchings **Date:** 12/17

Project: Plumbrook **SDG:** F15100 H2J18020 **Matrix/No. Samples:** W-3

I. Technical Holding Times			
A. Sample Preservation, Handling and Transport			
1. Have all samples been preserved correctly?	Yes	(No)	N/A
2. Have sample temperatures been kept at 4° C (+ or - 2 °)?	(Yes)	No	N/A
3. Were all samples received in proper condition?	(Yes)	No	N/A
4. Were any qualifications required based on this information?	(Yes)	No	N/A
Coolers @ CD3006 - high pH - b,t,eb - J/UJ 3°C, 3°C			
B. Chain of Custody			
1. Were all samples properly recorded on COCs?	(Yes)	No	N/A
2. Were correct analyses performed on samples?	(Yes)	No	N/A
C. Holding Times			
1. Were samples extracted and analyzed within acceptable holding times?	(Yes)	No	N/A
2. Were any qualifications required based on this information?	Yes	(No)	N/A

SAMPLED	PREPPED	ANALYZED
10/17	5, 6	10/24
	7 -	10/30

II. GC/MS Instrument Performance Check			
1. Were instrument performance check samples run for each analysis period?	(Yes)	No	N/A
2. Were ion abundance criteria met for bromofluorobenzene (BFB) analysis?	(Yes)	No	N/A
3. Do laboratory forms match raw data?	Yes	No	(N/A)
4. Were any qualifications required based on this information?	Yes	(No)	N/A

Comments/Qualifications:

ICAL BFB. CCALS.
all w/in limit

DATA VALIDATION WORKSHEETS
VOLATILE ORGANICS

Reviewer: Kitchings **Date:** 12/17

Project: Plumbrook **SDG:** F15100 HZJ18020 **Matrix/No. Samples:** w-3

III.	Initial Calibration			
	1. Were correct concentrations of standards used for initial calibration? Were samples analyzed within 12 hours of associated instrument performance check?	Yes	No	N/A
	2. Were initial calibration RRFs for all volatile target compounds and system monitoring compounds >or = 0.05? Do recalculations for RRFs agree with reported values?	Yes	No	N/A
	3. Were %RSDs < or = 30% for all volatile target compounds? Do recalculations for RSDs agree with reported values?	Yes	No	N/A
	4. Were any qualifications required based on this information?	Yes	No	N/A
	Comments/Qualifications: MC linear RSDs-ok RRF - low for acetone, 4 CCAL-ok.			

IV.	Continuing Calibration			
	1. Were continuing calibration samples run at the required frequency, and compared to the correct initial calibration?	Yes	No	N/A
	2. Did calculations from raw data agree with laboratory reported values for RRF and %D?	~~Yes~~ No	No	N/A
	3. Were continuing calibration RRFs for volatile organic compounds and system monitoring compounds (surrogates) > or = 0.05?	Yes	No	N/A
	4. Were %D between initial calibration RRF and the continuing calibration RRFs within + or - 25%?	Yes	No	N/A
	5. Were any qualifications required based on this information?	Yes	No	N/A
	Comments/Qualifications: 3005 %D's > 20%. 2-hex 25.0, bromof. 25.1, 4-m-2-p. 20.6 — UJ; 3005, 3006			

DATA VALIDATION WORKSHEETS
VOLATILE ORGANICS

Reviewer: Kitchings **Date:** 12/17

Project: Plumbrook **SDG:** F15100 HZJ18020 **Matrix/No. Samples:** w-3

V.	Blanks			
	1. Were any target or non-target compounds reported in laboratory prep or calibration blanks?	Yes	No	N/A
	2. Were method blank analyses performed at required frequency, and for each GC/MS system used to analyze samples for each type of analysis (i.e., matrix)?	Yes	No	N/A
	3. Were any qualifications required based on this information?	Yes	No	N/A

Comments/Qualifications: 3005, 3006 3007
10/24 MB - all u's.
~~MCC~~ 2-but. @ 1.8
4-M-2-P @ 1.1
both smp @ Na

VI.	System Monitoring Compounds (Surrogate Spikes)			
	1. Were laboratory surrogate recoveries calculated and reported correctly?	Yes	No	N/A
	2. Were surrogate recoveries within acceptable limits?	Yes	No	N/A
	3. Were any qualifications required based on surrogate spike QC information?	Yes	No	N/A

Comments/Qualifications: 96-98 99-105 101-108 97-116

VII.	Matrix Spikes/Matrix Spike Duplicates			
	1. Were MS/MSD samples analyzed at required frequency for each ample matrix?	Yes	No	N/A
	2. Were MS/MSD results for recovery and RPD within advisory limits?	Yes	No	N/A
	3. Were Samples used for MS/MSD field blanks?	Yes	No	N/A
	4. Were laboratory reported results correctly calculated from raw data?	~~Yes~~	No	~~N/A~~
	5. Were any qualifications required, based on results of MS/MSD samples in conjunction with other QC information?	Yes	No	N/A

Comments/Qualifications:
6 MSD TCE $\frac{10.1}{9.92}$ / 10.0 = 101% = 99.2% RPD $\frac{.18}{10.01}$ = 1.8%

7 ethylb. / xylene - low msd — ms ok / LCS ok - no quals.

2-hex / 4-M-2-P / styrene - high ms - msd ok & LCS ok - no quals.

DATA VALIDATION WORKSHEETS
VOLATILE ORGANICS

Reviewer: Kitchings **Date:** 12/17

Project: Plumbrook **SDG:** F-15160 HZJ 18020 **Matrix/No. Samples:** W-3

VIII.	Laboratory Control Sample (LCS)			
	1. Were LCS samples run at correct frequency for each matrix samples?	Yes	No	N/A
	2. Were LCS calculations performed correctly, and did laboratory reported values match raw data? Were recoveries within laboratory QC limits?	Yes	No	N/A
	4. Were any qualifications required based on LCS data in conjunction with other QC information?	Yes	No	N/A
	Comments/Qualifications: 5/4 LCS Tol. 9.76/10.00 = 97.6 10/24 range - 97-101 ✓ 7 LCS range 95-126 ✓			
IX.	**Internal Standards**			
	1. Were standard area counts within a factor of two (-50% to +100%) from associated calibration standard?	Yes	No	N/A
	2. Were retention times of internal standard within + or - 30 seconds of retention time of associated calibration check?	Yes	No	N/A
	3. Were any qualifications required based on internal standard results?	Yes	No	N/A
	Comments/Qualifications: all RTs area cts ok ✓			
X.	**Target Compound Identification**			
	1. Are relative retention times (RRTs) within + or - 0.06 RRT units of standard RRT?	Yes	No	N/A
	2. Do sample compound spectra meet specified criteria in relation to laboratory standard spectra?	Yes	No	N/A
	3. Were all compounds accounted for on chromatogram?	Yes	No	N/A
	Comments/Qualifications: No raw data			

DATA VALIDATION WORKSHEETS
VOLATILE ORGANICS

Reviewer: Kitchings **Date** 12/17

Project: Plumbrook **SDG:** F15100 HZJ18020 **Matrix/No. Samples:** w-3

XI. Compound Quantitation and Reported Contract Required Quantitation Limits (CRQLs)			
1. Were sample results correctly calculated and reported by laboratory?	Yes	No	N/A
2. Were correct internal standard quantitation ion and RRF used to quantify all compounds for all samples?	Yes	No	N/A
3. Were CRQLs adjusted to reflect sample dilutions and dry weight factors not accounted for by the method?	Yes	No	N/A
4. Were any laboratory QA/QC sample results calculated from peaks derived using manual integration?	Yes	No	N/A
5. Were any qualifications required based on this information?	Yes	No	N/A

Comments/Qualifications: No raw data.

XII. Field QC			
1. Were any Field Duplicates associated with this SDG?	Yes	No	N/A
a. If Yes, were RPDs acceptable (50% for water samples, 100% for soil samples)?	Yes	No	N/A
2. Were any field blanks or equipment rinsates associated with this SDG?	Yes	No	N/A
a. If yes, were any compounds reported in samples >IDL?	Yes	No	N/A
b. Were any qualifications required based on this information?	Yes	No	N/A

Comments/Qualifications:

TB CD5004
MC @ 2.7 (B)
CD3006

CD
TB 5005
— all nondetects.

XIII. Overall Assessment of Data			
1. Are there any specific concerns or limitations regarding the data in this SDG?	Yes	No	N/A

Comments/Qualifications:

SDG: F1S100 HZJ180210 Project: **Plum Brook**

Method: **Explosives** - 8330 Matrix/No. of Samples: Water - 3

Validation Samples: CD 3005
CD 3006
CD 3007

Data Validation Report Summary

		Status Code	Comments
1.	Sample Preservation, Handling, and Transport	A	
2.	Chain of Custody	A	
3.	Holding Times	A	
4.	GC/MS Tune/Inst Perf	N/A	
5.	Calibrations	A	
6.	Blanks	A	
7.	Blank Spike/LCS	A	
8.	Matrix Spike	A	
9.	Surrogates	A	
10.	Internal Standards	N/A	
11.	Compound Identification	A	
12.	System Performance	A	
13.	Field QC Samples	A	
14.	Overall Assessment	A	

Status Codes:
A = Acceptable
R = Data Rejected
X = Data acceptable but qualified due to problems

Qualifications:

Significant Findings/Recommendations:

Overall Data Quality:

Acceptable as reported

Validator's Signature: J. Thomas Kotchey Date: 12/17/2002

Peer Reviewer: KMK Date: 12-18-02

SHAW E & I INC

Client Sample ID: CD3005

HPLC

Lot-Sample #...: H2J180210-001 **Work Order #...:** FAA061AA **Matrix.....:** WATER
Date Sampled...: 10/17/02 **Date Received..:** 10/18/02
Prep Date.....: 10/22/02 **Analysis Date..:** 10/22/02
Prep Batch #...: 2294273
Dilution Factor: 1 **Method.....:** SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	Rev Qual
HMX	ND	0.50	ug/L	0.10	u
RDX	ND	0.50	ug/L	0.13	
1,3,5-Trinitrobenzene	ND	0.20	ug/L	0.11	
1,3-Dinitrobenzene	ND	0.20	ug/L	0.080	
Tetryl	ND	0.20	ug/L	0.17	
Nitrobenzene	**0.12 J**	**0.20**	**ug/L**	**0.070**	J
2,4,6-Trinitrotoluene	ND	0.20	ug/L	0.080	u
4-Amino-2,6-dinitrotoluene	ND	0.20	ug/L	0.11	
2-Amino-4,6-dinitrotoluene	ND	0.20	ug/L	0.090	
2,6-Dinitrotoluene	ND	0.20	ug/L	0.11	
2,4-Dinitrotoluene	ND	0.20	ug/L	0.070	
2-Nitrotoluene	ND	0.20	ug/L	0.14	
4-Nitrotoluene	ND	0.20	ug/L	0.17	
3-Nitrotoluene	ND	0.20	ug/L	0.13	

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	95	(53 - 133)

NOTE(S):

J Estimated result. Result is less than RL.

SHAW E & I INC

Client Sample ID: CD3006

HPLC

Lot-Sample #...: H2J180210-004 **Work Order #...:** FAA2A1AA **Matrix.....:** WATER
Date Sampled...: 10/17/02 **Date Received..:** 10/18/02
Prep Date.....: 10/22/02 **Analysis Date..:** 10/22/02
Prep Batch #...: 2294273
Dilution Factor: 1 **Method.....:** SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	Rev Qual
HMX	ND	0.50	ug/L	0.10	u
RDX	ND	0.50	ug/L	0.13	
1,3,5-Trinitrobenzene	ND	0.20	ug/L	0.11	
1,3-Dinitrobenzene	ND	0.20	ug/L	0.080	
Tetryl	ND	0.20	ug/L	0.17	
Nitrobenzene	**0.14 J**	**0.20**	**ug/L**	**0.070**	J
2,4,6-Trinitrotoluene	ND	0.20	ug/L	0.080	u
4-Amino-2,6-dinitrotoluene	ND	0.20	ug/L	0.11	
2-Amino-4,6-dinitrotoluene	ND	0.20	ug/L	0.090	
2,6-Dinitrotoluene	ND	0.20	ug/L	0.11	
2,4-Dinitrotoluene	ND	0.20	ug/L	0.070	
2-Nitrotoluene	ND	0.20	ug/L	0.14	
4-Nitrotoluene	ND	0.20	ug/L	0.17	
3-Nitrotoluene	ND	0.20	ug/L	0.13	

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	80	(53 - 133)

NOTE(S):

J Estimated result. Result is less than RL.

Accutest Laboratories

Report of Analysis

Client Sample ID:	CD3007		
Lab Sample ID:	F15100-1	**Date Sampled:**	10/17/02
Matrix:	AQ - Ground Water	**Date Received:**	10/18/02
Method:	SW846 8330A SW846 8330A	**Percent Solids:**	n/a
Project:	PBOW		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG004164.D	1	10/22/02	MRE	10/21/02	OP6145	GGG220
Run #2							

	Initial Volume	Final Volume
Run #1	1040 ml	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q	Rw Qual
2691-41-0	HMX	ND	0.19	0.048	ug/l		u
121-82-4	RDX	ND	0.19	0.072	ug/l		
99-65-0	1,3-Dinitrobenzene	ND	0.19	0.048	ug/l		
606-20-2	2,6-Dinitrotoluene	ND	0.19	0.096	ug/l		
121-14-2	2,4-Dinitrotoluene	ND	0.19	0.072	ug/l		
35572-78-2	2-amino-4,6-Dinitrotc	ND	0.19	0.096	ug/l		
19406-51-0	4-amino-2,6-Dinitrotc	ND	0.19	0.072	ug/l		
98-95-3	Nitrobenzene	ND	0.19	0.072	ug/l		
88-72-2	o-Nitrotoluene	ND	0.19	0.096	ug/l		
99-08-1	m-Nitrotoluene	ND	0.19	0.072	ug/l		
99-99-0	p-Nitrotoluene	ND	0.19	0.072	ug/l		
479-45-8	Tetryl	ND	0.19	0.072	ug/l		
99-35-4	1,3,5-Trinitrobenzene	ND	0.19	0.072	ug/l		
118-96-7	2,4,6-Trinitrotoluene	ND	0.19	0.048	ug/l		

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	79%		51-137%

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated m
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a com

DATA VALIDATION WORKSHEET
EXPLOSIVES AND DEGRADATION PRODUCTS BY HPLC

Reviewer: Kitchings **Date:** 12/17

Project: Plum Brook **SDG:** F15100 HZJ 180210 **Matrix/No. Samples:** W-3

I. Technical Holding Times			
A. Sample Preservation, Handling and Transport			
1. Have all samples been preserved correctly?	Yes	No	N/A
2. Have sample temperatures been kept at 4° C (+or- 2 ° C)	Yes	No	N/A
3. Were all samples received in proper condition?	Yes	No	N/A
4. Were any qualifications required based on this information?	Yes	No	N/A
Cooler @ 3°, 3°C.			
B. Chain of Custody			
1. Were all samples properly recorded on COCs?	Yes	No	N/A
2. Were correct analyses performed on samples?	Yes	No	N/A
C. Holding Times			
1. Were samples extracted and analyzed within acceptable holding times?	Yes	No	N/A
2. Were any qualifications required based on this information?	Yes	No	N/A

Sampled	Prepped	Analyzed
10/17	10/22	10/22
	10/21	10/22

II. Initial Calibration			
1. Were correct numbers and concentrations of standards used for initial calibration standards to establish calibration curve (i.e., water: 9 standards; soil: 7 standards)?	Yes	No	N/A
2. For sample results calculated using initial calibration, was correct standard used for calculating sample result?	Yes	No	N/A
3. Was calibration range within 25% of method range?	Yes	No	N/A
4. Were retention Times (RTs) within acceptable RT windows?	Yes	No	N/A

Comments/Qualifications:

ICAL RSDs @ <10%

DATA VALIDATION WORKSHEET
EXPLOSIVES AND DEGRADATION PRODUCTS BY HPLC

Reviewer: Kitchings **Date:** 12/17

Project: Plum Brook **SDG:** F15100 HZJ180210 **Matrix/No. Samples:** W-3

III.	Continuing Calibration			
	1. Were continuing calibration samples run at the required frequency, and compared to the correct initial calibration?	Yes	No	N/A
	2. Were RTs for all standard compounds in continuing calibration samples within acceptable RT window?	Yes	No	N/A
	3. Were continuing calibration recoveries within control limit of 75-125%?	Yes	No	N/A
	4. Did laboratory reported calculations and data match raw data?	Yes	No	N/A
	5. Were any qualifications required based on this information?	Yes	No	N/A

Comments/Qualifications: CCAL's %D @<8% for all cpds.

IV.	Blanks			
	1. Does data package include summary of method blank results?	Yes	No	N/A
	2. Were any compounds reported in laboratory method blanks?	Yes	No	N/A
	3. Were method blank analyses performed at required frequency?	Yes	No	N/A
	4. Were any qualifications required based on this information?	Yes	No	N/A

Comments/Qualifications: all MB's @ nondetect

V.	System Monitoring Compounds (Surrogate Spikes)			
	1. Were all samples spiked with correct surrogate compounds?	Yes	No	N/A
	2. Were laboratory surrogate recoveries calculated and reported correctly on data forms?	Yes	No	N/A
	3. Were surrogate recoveries within laboratory established limits?	Yes	No	N/A
	4. Were any qualifications required based on surrogate spike QC information?	Yes	No	N/A

Comments/Qualifications: surrg. 95, 80, 79 (5, 6, 7) ~~79-100~~

DATA VALIDATION WORKSHEET
EXPLOSIVES AND DEGRADATION PRODUCTS BY HPLC

Reviewer: Kitchings **Date:** 12/17

Project: Plum Brook **SDG:** F 15100 HZJ 180210 **Matrix/No. Samples:** W-3

VI.	Matrix Spikes/ Matrix Spike Duplicates			
	1. Were MS/MSD samples analyzed at required frequency for each ample matrix (at least 5%)?	Yes	No	N/A
	2. Were MS/MSD results for recovery (+or- 40%) RPD (<30) within laboratory QC limits?	Yes	No	N/A
	3. Were Samples used for MS/MSD field blanks?	Yes	No	N/A
	4. Were matrix spike recoveries and RPDs calculated and reported correctly?	Yes	No	N/A
	5. Were any qualifications required, based on results of MS/MSD samples in conjunction with other QC information?	Yes	No	N/A

Comments/Qualifications:

Tetryl had a low MS/MSD

LCS - Ok - no quals.

VII.	Laboratory Control Sample (LCS)			
	1. Were LCS samples run?	Yes	No	N/A
	2. If performed, were LCS recoveries within the QC limits?	Yes	No	N/A
	3. If performed, were LCS calculations performed correctly, and did laboratory reported values match raw data?	Yes	No	N/A
	4. Were any qualifications required based on LCS data in conjunction with other QC information?	Yes	No	N/A

Comments/Qualifications:

		Range of Rs	
5,6	LCS	79-91	all w/in limits
7		92-100	

DATA VALIDATION WORKSHEET
EXPLOSIVES AND DEGRADATION PRODUCTS BY HPLC

Reviewer: Kitchings **Date:** 12/17

Project: Plum Brook **SDG:** F15100 HZJ180210 **Matrix/No. Samples:** W-3

VIII. Field QC Samples			
1. Were field blank or equipment rinsate samples associated with this SDG?	Yes	(No)	N/A
2. Were any compounds present in any associated field blank samples?	Yes	No	N/A
3. Were any field duplicate pairs analyzed in this SDG?	(Yes)	No	N/A
4. Were RPDs field duplicate pairs within acceptable limits (+ or -20%)	(Yes)	No	N/A
5. Were any qualifications required based on field QC information?	Yes	(No)	N/A

Comments/Qualifications: 5 6
0.12 NB 0.14
.02 / .13 15.4%

IX. Compound Identification			
1. Are relative retention times (RRTs) within acceptable RRT windows?	Yes	No	N/A
2. Were identified compounds confirmed on second column?	Yes	No	N/A
3. Were any qualification required based on this information?	Yes	No	N/A

Comments/Qualifications: No raw data.

X. Overall Assessment of Data			
1. Are there any specific concerns or limitations regarding the data in this SDG?	Yes	(No)	N/A

Comments/Qualifications:

SDG: H2J180210 F15100 Project: Plum Brook Ordnance Works - CQAR

Method: Semivolatiles - 8270 C Matrix/No. Samples: Water - 3

Validation Samples: CD3005
CD3006
CD3007

Data Validation Report Summary

		Status Code	Comments
1.	Sample Preservation, Handling, and Transport	A	
2.	Chain of Custody	A	
3.	Holding Times	A	
4.	GC/MS Tune/Inst Perf	A	
5.	Calibrations	A	
6.	Blanks	A	
7.	Blank Spike/LCS	A	
8.	Matrix Spike	A	
9.	Surrogates	A	
10.	Internal Standards	A	
11.	Compound Identification	A	
12.	System Performance	A	
13.	Field QC Samples	A	
14.	Overall Assessment	A	

Status Codes:
A = Acceptable
R = Data Rejected
X = Data acceptable but qualified due to problems

Qualifications:

Significant Findings/Recommendations:

Overall Data Quality:

Acceptable as reported

Validator's Signature: J. Thomas Kitchings Date: 12/17/2002

Peer Reviewer: Jm K Date: 12-18-02

SHAW E & I INC

Client Sample ID: CD3005

GC/MS Semivolatiles

Lot-Sample #...: H2J180210-001 Work Order #...: FAA061AH Matrix.....: WATER
Date Sampled...: 10/17/02 Date Received..: 10/18/02
Prep Date.....: 10/21/02 Analysis Date..: 10/25/02
Prep Batch #...: 2294193
Dilution Factor: 1 Method.....: SW846 8270C

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	Rev Qual
Phenol	ND	10	ug/L	1.2	u
bis(2-Chloroethyl)-ether	ND	10	ug/L	1.1	
2-Chlorophenol	ND	10	ug/L	1.5	
1,3-Dichlorobenzene	ND	10	ug/L	1.3	
1,4-Dichlorobenzene	ND	10	ug/L	1.7	
1,2-Dichlorobenzene	ND	10	ug/L	1.1	
2-Methylphenol	ND	10	ug/L	1.0	
2,2'-oxybis(1-Chloro-propane)	ND	10	ug/L	1.3	
4-Methylphenol	ND	10	ug/L	2.1	
N-Nitrosodi-n-propyl-amine	ND	10	ug/L	1.4	
Hexachloroethane	ND	10	ug/L	1.6	
Nitrobenzene	ND	10	ug/L	1.6	
Isophorone	ND	10	ug/L	1.2	
2-Nitrophenol	ND	10	ug/L	1.7	
2,4-Dimethylphenol	ND	10	ug/L	1.8	
bis(2-Chloroethoxy) methane	ND	10	ug/L	1.2	
2,4-Dichlorophenol	ND	10	ug/L	1.4	
1,2,4-Trichloro-benzene	ND	10	ug/L	1.5	
Naphthalene	ND	10	ug/L	1.4	
4-Chloroaniline	ND	10	ug/L	1.2	
Hexachlorobutadiene	ND	10	ug/L	1.4	
4-Chloro-3-methylphenol	ND	10	ug/L	0.56	
2-Methylnaphthalene	ND	10	ug/L	1.0	
Hexachlorocyclopenta-diene	ND	50	ug/L	1.2	
2,4,6-Trichloro-phenol	ND	10	ug/L	1.3	
2,4,5-Trichloro-phenol	ND	10	ug/L	1.8	
2-Chloronaphthalene	ND	10	ug/L	1.3	
2-Nitroaniline	ND	50	ug/L	1.2	
Dimethyl phthalate	ND	10	ug/L	1.4	
Acenaphthylene	ND	10	ug/L	1.1	
2,6-Dinitrotoluene	ND	10	ug/L	1.5	

(Continued on next page)

SHAW E & I INC

Client Sample ID: CD3005

GC/MS Semivolatiles

Lot-Sample #...: H2J180210-001 Work Order #...: FAA061AH Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	Revqual
3-Nitroaniline	ND	50	ug/L	1.5	u
Acenaphthene	ND	10	ug/L	1.1	
2,4-Dinitrophenol	ND	50	ug/L	11	
4-Nitrophenol	ND	50	ug/L	5.7	
Dibenzofuran	ND	10	ug/L	1.2	
2,4-Dinitrotoluene	ND	10	ug/L	1.2	
Diethyl phthalate	ND	10	ug/L	1.4	
4-Chlorophenyl phenyl ether	ND	10	ug/L	1.3	
Fluorene	ND	10	ug/L	1.3	
4-Nitroaniline	ND	50	ug/L	1.3	
4,6-Dinitro-2-methylphenol	ND	50	ug/L	6.5	
N-Nitrosodiphenylamine	ND	10	ug/L	1.2	
4-Bromophenyl phenyl ether	ND	10	ug/L	1.8	
Hexachlorobenzene	ND	10	ug/L	1.4	
Pentachlorophenol	ND	50	ug/L	1.1	
Phenanthrene	ND	10	ug/L	1.4	
Anthracene	ND	10	ug/L	1.3	
Carbazole	ND	10	ug/L	1.5	
Di-n-butyl phthalate	ND	10	ug/L	1.6	
Fluoranthene	ND	10	ug/L	1.4	
Pyrene	ND	10	ug/L	1.2	
Butyl benzyl phthalate	ND	10	ug/L	1.7	
3,3'-Dichlorobenzidine	ND	50	ug/L	1.1	
Benzo(a)anthracene	ND	10	ug/L	1.2	
Chrysene	ND	10	ug/L	1.6	
bis(2-Ethylhexyl) phthalate	ND	10	ug/L	1.9	
Di-n-octyl phthalate	ND	10	ug/L	1.9	
Benzo(b)fluoranthene	ND	10	ug/L	1.0	
Benzo(k)fluoranthene	ND	10	ug/L	2.0	
Benzo(a)pyrene	ND	10	ug/L	2.0	
Indeno(1,2,3-cd)pyrene	ND	10	ug/L	0.83	
Dibenz(a,h)anthracene	ND	10	ug/L	1.2	
Benzo(ghi)perylene	ND	10	ug/L	1.1	

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	60	(29 - 110)
Phenol-d5	68	(41 - 115)
Nitrobenzene-d5	65	(46 - 117)
2-Fluorobiphenyl	74	(44 - 116)
2,4,6-Tribromophenol	97	(31 - 138)
Terphenyl-d14	100	(36 - 134)

SHAW E & I INC

Client Sample ID: CD3006

GC/MS Semivolatiles

Lot-Sample #...: H2J180210-004 Work Order #...: FAA2A1AD Matrix.....: WATER
Date Sampled...: 10/17/02 Date Received..: 10/18/02
Prep Date.....: 10/21/02 Analysis Date..: 10/25/02
Prep Batch #...: 2294193
Dilution Factor: 1 Method.....: SW846 8270C

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	Rev'd Ind
Phenol	ND	10	ug/L	1.2	u
bis(2-Chloroethyl)-ether	ND	10	ug/L	1.1	
2-Chlorophenol	ND	10	ug/L	1.5	
1,3-Dichlorobenzene	ND	10	ug/L	1.3	
1,4-Dichlorobenzene	ND	10	ug/L	1.7	
1,2-Dichlorobenzene	ND	10	ug/L	1.1	
2-Methylphenol	ND	10	ug/L	1.0	
2,2'-oxybis(1-Chloro-propane)	ND	10	ug/L	1.3	
4-Methylphenol	ND	10	ug/L	2.1	
N-Nitrosodi-n-propyl-amine	ND	10	ug/L	1.4	
Hexachloroethane	ND	10	ug/L	1.6	
Nitrobenzene	ND	10	ug/L	1.6	
Isophorone	ND	10	ug/L	1.2	
2-Nitrophenol	ND	10	ug/L	1.7	
2,4-Dimethylphenol	ND	10	ug/L	1.8	
bis(2-Chloroethoxy) methane	ND	10	ug/L	1.2	
2,4-Dichlorophenol	ND	10	ug/L	1.4	
1,2,4-Trichloro-benzene	ND	10	ug/L	1.5	
Naphthalene	ND	10	ug/L	1.4	
4-Chloroaniline	ND	10	ug/L	1.2	
Hexachlorobutadiene	ND	10	ug/L	1.4	
4-Chloro-3-methylphenol	ND	10	ug/L	0.56	
2-Methylnaphthalene	ND	10	ug/L	1.0	
Hexachlorocyclopenta-diene	ND	50	ug/L	1.2	
2,4,6-Trichloro-phenol	ND	10	ug/L	1.3	
2,4,5-Trichloro-phenol	ND	10	ug/L	1.8	
2-Chloronaphthalene	ND	10	ug/L	1.3	
2-Nitroaniline	ND	50	ug/L	1.2	
Dimethyl phthalate	ND	10	ug/L	1.4	
Acenaphthylene	ND	10	ug/L	1.1	
2,6-Dinitrotoluene	ND	10	ug/L	1.5	

(Continued on next page)

SHAW E & I INC

Client Sample ID: CD3006

GC/MS Semivolatiles

Lot-Sample #...: H2J180210-004 Work Order #...: FAA2A1AD Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	Rev Qual
3-Nitroaniline	ND	50	ug/L	1.5	u
Acenaphthene	ND	10	ug/L	1.1	
2,4-Dinitrophenol	ND	50	ug/L	11	
4-Nitrophenol	ND	50	ug/L	5.7	
Dibenzofuran	ND	10	ug/L	1.2	
2,4-Dinitrotoluene	ND	10	ug/L	1.2	
Diethyl phthalate	ND	10	ug/L	1.4	
4-Chlorophenyl phenyl ether	ND	10	ug/L	1.3	
Fluorene	ND	10	ug/L	1.3	
4-Nitroaniline	ND	50	ug/L	1.3	
4,6-Dinitro-2-methylphenol	ND	50	ug/L	6.5	
N-Nitrosodiphenylamine	ND	10	ug/L	1.2	
4-Bromophenyl phenyl ether	ND	10	ug/L	1.8	
Hexachlorobenzene	ND	10	ug/L	1.4	
Pentachlorophenol	ND	50	ug/L	1.1	
Phenanthrene	ND	10	ug/L	1.4	
Anthracene	ND	10	ug/L	1.3	
Carbazole	ND	10	ug/L	1.5	
Di-n-butyl phthalate	ND	10	ug/L	1.6	
Fluoranthene	ND	10	ug/L	1.4	
Pyrene	ND	10	ug/L	1.2	
Butyl benzyl phthalate	ND	10	ug/L	1.7	
3,3'-Dichlorobenzidine	ND	50	ug/L	1.1	
Benzo(a)anthracene	ND	10	ug/L	1.2	
Chrysene	ND	10	ug/L	1.6	
bis(2-Ethylhexyl) phthalate	ND	10	ug/L	1.9	
Di-n-octyl phthalate	ND	10	ug/L	1.9	
Benzo(b)fluoranthene	ND	10	ug/L	1.0	
Benzo(k)fluoranthene	ND	10	ug/L	2.0	
Benzo(a)pyrene	ND	10	ug/L	2.0	
Indeno(1,2,3-cd)pyrene	ND	10	ug/L	0.83	
Dibenz(a,h)anthracene	ND	10	ug/L	1.2	
Benzo(ghi)perylene	ND	10	ug/L	1.1	

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	74	(29 - 110)
Phenol-d5	79	(41 - 115)
Nitrobenzene-d5	75	(46 - 117)
2-Fluorobiphenyl	85	(44 - 116)
2,4,6-Tribromophenol	94	(31 - 138)
Terphenyl-d14	104	(36 - 134)

Accutest Laboratories

Report of Analysis

Client Sample ID:	CD3007		
Lab Sample ID:	F15100-1	**Date Sampled:**	10/17/02
Matrix:	AQ - Ground Water	**Date Received:**	10/18/02
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	PBOW		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L015098.D	1	10/28/02	ME	10/24/02	OP6170	SL834
Run #2							

	Initial Volume	Final Volume
Run #1	1030 ml	1.0 ml
Run #2		

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q	Rev q ucl
65-85-0	Benzoic Acid	ND	24	15	ug/l		u
95-57-8	2-Chlorophenol	ND	4.9	1.9	ug/l		
59-50-7	4-Chloro-3-methyl phe	ND	4.9	1.9	ug/l		
120-83-2	2,4-Dichlorophenol	ND	4.9	1.9	ug/l		
105-67-9	2,4-Dimethylphenol	ND	4.9	1.9	ug/l		
51-28-5	2,4-Dinitrophenol	ND	24	9.7	ug/l		
534-52-1	4,6-Dinitro-o-cresol	ND	9.7	7.3	ug/l		
95-48-7	2-Methylphenol	ND	4.9	1.9	ug/l		
	3&4-Methylphenol	ND	4.9	1.9	ug/l		
88-75-5	2-Nitrophenol	ND	4.9	1.9	ug/l		
100-02-7	4-Nitrophenol	ND	24	9.7	ug/l		
87-86-5	Pentachlorophenol	ND	24	9.7	ug/l		
108-95-2	Phenol	ND	4.9	1.9	ug/l		
95-95-4	2,4,5-Trichlorophenol	ND	4.9	2.4	ug/l		
88-06-2	2,4,6-Trichlorophenol	ND	4.9	1.9	ug/l		
83-32-9	Acenaphthene	ND	4.9	0.97	ug/l		
208-96-8	Acenaphthylene	ND	4.9	0.97	ug/l		
120-12-7	Anthracene	ND	4.9	0.97	ug/l		
56-55-3	Benzo(a)anthracene	ND	4.9	0.97	ug/l		
50-32-8	Benzo(a)pyrene	ND	4.9	0.97	ug/l		
205-99-2	Benzo(b)fluoranthene	ND	4.9	0.97	ug/l		
191-24-2	Benzo(g,h,i)perylene	ND	4.9	1.9	ug/l		
207-08-9	Benzo(k)fluoranthene	ND	4.9	0.97	ug/l		
101-55-3	4-Bromophenyl phenyl	ND	4.9	0.97	ug/l		
85-68-7	Butyl benzyl phthalat	ND	4.9	1.9	ug/l		
100-51-6	Benzyl Alcohol	ND	4.9	0.97	ug/l		
91-58-7	2-Chloronaphthalene	ND	4.9	0.97	ug/l		
106-47-8	4-Chloroaniline	ND	4.9	1.9	ug/l		
86-74-8	Carbazole	ND	4.9	0.97	ug/l		
218-01-9	Chrysene	ND	4.9	0.97	ug/l		
111-91-1	bis(2-Chloroethoxy)me	ND	4.9	0.97	ug/l		
111-44-4	bis(2-Chloroethyl)eth	ND	4.9	1.9	ug/l		

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated m
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a com

Report of Analysis

Client Sample ID:	CD3007		
Lab Sample ID:	F15100-1	**Date Sampled:**	10/17/02
Matrix:	AQ - Ground Water	**Date Received:**	10/18/02
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	PBOW		

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q	Rev Qual
108-60-1	bis(2-Chloroisopropyl	ND	4.9	0.97	ug/l		u
7005-72-3	4-Chlorophenyl phenyl	ND	4.9	0.97	ug/l		
95-50-1	1,2-Dichlorobenzene	ND	4.9	0.97	ug/l		
541-73-1	1,3-Dichlorobenzene	ND	4.9	0.97	ug/l		
106-46-7	1,4-Dichlorobenzene	ND	4.9	0.97	ug/l		
121-14-2	2,4-Dinitrotoluene	ND	4.9	1.9	ug/l		
606-20-2	2,6-Dinitrotoluene	ND	4.9	1.9	ug/l		
91-94-1	3,3'-Dichlorobenzidir	ND	9.7	4.9	ug/l		
53-70-3	Dibenzo(a,h)anthracer	ND	4.9	1.9	ug/l		
132-64-9	Dibenzofuran	ND	4.9	0.97	ug/l		
84-74-2	Di-n-butyl phthalate	ND	4.9	1.9	ug/l		
117-84-0	Di-n-octyl phthalate	ND	4.9	2.4	ug/l		
84-66-2	Diethyl phthalate	ND	4.9	1.9	ug/l		
131-11-3	Dimethyl phthalate	ND	4.9	1.9	ug/l		
117-81-7	bis(2-Ethylhexyl)phtl	ND	4.9	2.4	ug/l		
206-44-0	Fluoranthene	ND	4.9	0.97	ug/l		
86-73-7	Fluorene	ND	4.9	0.97	ug/l		
118-74-1	Hexachlorobenzene	ND	4.9	0.97	ug/l		
87-68-3	Hexachlorobutadiene	ND	4.9	1.9	ug/l		
77-47-4	Hexachlorocyclopentac	ND	4.9	1.9	ug/l		
67-72-1	Hexachloroethane	ND	4.9	1.9	ug/l		
193-39-5	Indeno(1,2,3-cd)pyrer	ND	4.9	1.9	ug/l		
78-59-1	Isophorone	ND	4.9	0.97	ug/l		
91-57-6	2-Methylnaphthalene	ND	4.9	0.97	ug/l		
88-74-4	2-Nitroaniline	ND	4.9	1.9	ug/l		
99-09-2	3-Nitroaniline	ND	4.9	1.9	ug/l		
100-01-6	4-Nitroaniline	ND	4.9	1.9	ug/l		
91-20-3	Naphthalene	ND	4.9	0.97	ug/l		
98-95-3	Nitrobenzene	ND	4.9	0.97	ug/l		
621-64-7	N-Nitroso-di-n-propyl	ND	4.9	1.9	ug/l		
86-30-6	N-Nitrosodiphenylamir	ND	4.9	1.9	ug/l		
85-01-8	Phenanthrene	ND	4.9	0.97	ug/l		
129-00-0	Pyrene	ND	4.9	0.97	ug/l		
120-82-1	1,2,4-Trichlorobenzer	ND	4.9	0.97	ug/l		

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	62%		19-90%
4165-62-2	Phenol-d5	41%		10-68%
118-79-6	2,4,6-Tribromophenol	93%		36-137%

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated m
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a con

DATA VALIDATION WORKSHEETS
SEMIVOLATILE ORGANICS

Reviewer: Kitchings **Date:** 12/17

Project: Plum Brook **SDG:** F15100 HZJ180210 **Matrix/No. Samples:** w-3

I. Technical Holding Times			
A. Sample Preservation, Handling and Transport			
1. Have all samples been preserved correctly?	Yes	No	N/A
2. Have sample temperatures been kept at 4° C (+ or - 2 °)?	Yes	No	N/A
3. Were all samples received in proper condition?	Yes	No	N/A
4. Were any qualifications required based on this information?	Yes	No	N/A
Coolers @ 3°, 3°.			
B. Chain of Custody			
1. Were all samples properly recorded on COCs?	Yes	No	N/A
2. Were correct analyses performed on samples?	Yes	No	N/A
C. Holding Times			
1. Were samples extracted and analyzed within acceptable holding times?	Yes	No	N/A
2. Were any qualifications required based on this information?	Yes	No	N/A

SAMPLED		PREPPED	ANALYZED
10/17	5,6	10/21	10/25
	7	10/24	10/28

II. GC/MS Instrument Performance Check			
1. Were instrument performance check samples run for each analysis period?	Yes	No	N/A
2. Were ion abundance criteria met for DTFPP analysis?	Yes	No	N/A
3. Do laboratory forms match raw data?	Yes	No	N/A
4. Were any qualifications required based on this information?	Yes	No	N/A

Comments/Qualifications:

ICAL CCAL
all w/in limits

DATA VALIDATION WORKSHEETS
SEMIVOLATILE ORGANICS

Reviewer: Kitchings **Date:** 12/17

Project: Plum Brook **SDG:** F15100 HZJ180 ZP **Matrix/No. Samples:** w-3

III.	Initial Calibration			
	1. Were correct concentrations of standards used for initial calibration? Were samples analyzed within 12 hours of associated instrument performance check?	Yes	No	N/A
	2. Were initial calibration RRFs for all volatile target compounds and system monitoring compounds >or = 0.05? Do recalculations for RRFs agree with reported values?	Yes	No	N/A
	3. Were %RSDs < or = 30% for all volatile target compounds? Do recalculations for RSDs agree with reported values?	Yes	No	N/A
	4. Were any qualifications required based on this information?	Yes	No	N/A
	Comments/Qualifications: RSD's <20% RRFs >0.05			

IV.	Continuing Calibration			
	1. Were continuing calibration samples run at the required frequency, and compared to the correct initial calibration?	Yes	No	N/A
	2. Did calculations from raw data agree with laboratory reported values for RRF and %D?	Yes	No	N/A
	3. Were continuing calibration RRFs for volatile organic compounds and system monitoring compounds (surrogates) > or = 0.05?	Yes	No	N/A
	4. Were %D between initial calibration RRF and the continuing calibration RRFs within + or - 25%?	Yes	No	N/A
	5. Were any qualifications required based on this information?	Yes	No	N/A
	Comments/Qualifications: CCAL all %D's <20%			

DATA VALIDATION WORKSHEETS
SEMIVOLATILE ORGANICS

Reviewer: Kitchings **Date:** 12/17

Project: Plum Brook **SDG:** F15100 H2J180210 **Matrix/No. Samples:** W-3

V.	Blanks			
	1. Were any target or non-target compounds reported in laboratory prep or calibration blanks?	Yes	(No)	N/A
	2. Were method blank analyses performed at required frequency, and for each GC/MS system used to analyze samples for each type of analysis (i.e., matrix)?	(Yes)	No	N/A
	3. Were any qualifications required based on this information?	Yes	(No)	N/A
	Comments/Qualifications: 5,6 MB all u's 7 MB all u's.			

VI.	System Monitoring Compounds (Surrogate Spikes)			
	1. Were laboratory surrogate recoveries calculated and reported correctly?	(Yes)	No	N/A
	2. Were surrogate recoveries within acceptable limits?	(Yes)	No	N/A
	3. Were any qualifications required based on surrogate spike QC information?	Yes	(No)	N/A
	Comments/Qualifications: all w/in limits bottom F F's.			

VII.	Matrix Spikes/Matrix Spike Duplicates			
	1. Were MS/MSD samples analyzed at required frequency for each ample matrix?	(Yes)	No	N/A
	2. Were MS/MSD results for recovery and RPD within advisory limits?	(Yes)	No	N/A
	3. Were Samples used for MS/MSD field blanks?	Yes	(No)	N/A
	4. Were laboratory reported results correctly calculated from raw data?	Yes	No	(N/A)
	5. Were any qualifications required, based on results of MS/MSD samples in conjunction with other QC information?	Yes	(No)	N/A
	Comments/Qualifications: all ok			

DATA VALIDATION WORKSHEETS
SEMIVOLATILE ORGANICS

Reviewer: Kitchings **Date:** 12/17

Project: Plum Brook **SDG:** T-15100 H2J180210 **Matrix/No. Samples:** w-3

VIII.	Laboratory Control Sample (LCS)			
	1. Were LCS samples run at correct frequency for each matrix samples?	Yes	No	N/A
	2. Were LCS calculations performed correctly, and did laboratory reported values match raw data? Were recoveries within laboratory QC limits?	Yes	No	N/A
	4. Were any qualifications required based on LCS data in conjunction with other QC information?	Yes	No	N/A
	Comments/Qualifications: range 74-90			

IX.	Internal Standards			
	1. Were standard area counts within a factor of two (-50% to +100%) from associated calibration standard?	Yes	No	N/A
	2. Were retention times of internal standard within + or - 30 seconds of retention time of associated calibration check?	Yes	No	N/A
	3. Were any qualifications required based on internal standard results?	Yes	No	N/A
	Comments/Qualifications: all area cts. RTs } w/in limits			

X.	Target Compound Identification			
	1. Are relative retention times (RRTs) within + or - 0.06 RRT units of standard RRT?	Yes	No	N/A
	2. Do sample compound spectra meet specified criteria in relation to laboratory standard spectra?	Yes	No	N/A
	3. Were all compounds accounted for on chromatogram?	Yes	No	N/A
	Comments/Qualifications: No detects / No raw data			

DATA VALIDATION WORKSHEETS
SEMIVOLATILE ORGANICS

Reviewer: Kitchings **Date:** 12/17

Project: Plum Brook **SDG:** F15100 HZJ180210 **Matrix/No. Samples:** W-3

XI.	Compound Quantitation and Reported Contract Required Quantitation Limits (CRQLs)			
	1. Were sample results correctly calculated and reported by laboratory?	Yes	No	N/A
	2. Were correct internal standard quantitation ion and RRF used to quantify all compounds for all samples?	Yes	No	N/A
	3. Were CRQLs adjusted to reflect sample dilutions and dry weight factors not accounted for by the method?	Yes	No	N/A
	4. Were any laboratory QA/QC sample results calculated from peaks derived using manual integration?	Yes	No	N/A
	5. Were any qualifications required based on this information?	Yes	No	N/A
	Comments/Qualifications: No raw data			

XII.	Field QC			
	1. Were any Field Duplicates associated with this SDG?	Yes	No	N/A
	a. If Yes, were RPDs acceptable (50% for water samples, 100% for soil samples)?	Yes	No	N/A
	2. Were any field blanks or equipment rinsates associated with this SDG?	Yes	No	N/A
	a. If yes, were any compounds reported in samples >IDL?	Yes	No	N/A
	b. Were any qualifications required based on this information?	Yes	No	N/A
	Comments/Qualifications: fd's 3005 3006 no detects.			

XIII.	Overall Assessment of Data			
	1. Are there any specific concerns or limitations regarding the data in this SDG?	Yes	No	N/A
	Comments/Qualifications:			

SDG: H2J 180210 (H5100) Project: PLUMBROOK

Method: METALS 6010B / 7470A Matrix/No. of Samples: Water - 3

Validation Samples: CD 3005
CD 3006
CD 3007

Data Validation Report Summary

		Status Code	Comments
1.	Sample Preservation, Handling, and Transport	A	
2.	Chain of Custody	A	
3.	Holding Times	A	
4.	Calibrations	A	
5.	Blanks	X	
6.	ICP/ICS	A	
7.	Blank Spike/LCS	A	
8.	Duplicates	N/A	
9.	Matrix Spike	A	
10.	Furnace Atomic Absorption QC	N/A	
11.	ICP Serial Dilution	X	
12.	Sample Result Verification	A	
13.	Field QC Samples	A	
14.	Overall Assessment	X	

Status Codes:
A = Acceptable
R = Data Rejected
X = Data acceptable but qualified due to problems

Qualifications:

13 · Potassium had a high serial dilution for both sample sets and all 3 samples were qualified as "J".

6a · Contamination in the method blanks resulted in "B" qualifiers for

Zinc	Thallium
3006D	3006T
3006D	3006D

Significant Findings/Recommendations:

Overall Data Quality:

Acceptable as qualified.

Date: 12/17/2002

Validator's Signature: J. Thomas Katchings

Peer Reviewer: KMK

SHAW E & I INC

Client Sample ID: CD3005

TOTAL Metals

Lot-Sample #...: H2J180210-001 **Matrix.....:** WATER
Date Sampled...: 10/17/02 **Date Received..:** 10/18/02

PARAMETER	RESULT	REPORTING LIMIT	UNITS	Rev Qual	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 2293115							
Mercury	ND	0.20	ug/L	U	SW846 7470A	10/20-10/21/02	FAA061DT
		Dilution Factor: 1			Analysis Time..: 12:24	MDL.....: 0.030	
Prep Batch #...: 2296221							
Aluminum	**79.7 B**	**200**	**ug/L**	J	**SW846 6010B**	**10/24-10/25/02**	**FAA061AL**
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 18.4	
Antimony	ND	60.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061AP
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 3.1	
Arsenic	ND	10.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061AT
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 2.7	
Barium	**277**	**200**	**ug/L**		**SW846 6010B**	**10/24-10/25/02**	**FAA061AW**
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 0.50	
Beryllium	ND	5.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061A1
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 0.22	
Cadmium	ND	5.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061A4
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 0.22	
Calcium	**200000 J**	**5000**	**ug/L**		**SW846 6010B**	**10/24-10/25/02**	**FAA061A7**
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 10.0	
Chromium	ND	10.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061CA
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 1.0	
Cobalt	ND	50.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061CE
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 1.0	
Copper	ND	25.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061CH
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 1.0	
Iron	**207**	**100**	**ug/L**		**SW846 6010B**	**10/24-10/25/02**	**FAA061CL**
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 16.2	
Lead	ND	3.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061CP
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 0.92	

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SHAW E & I INC

Client Sample ID: CD3005

TOTAL Metals

Lot-Sample #...: H2J180210-001 **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	Rev Qual	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Magnesium	**80200**	**5000**	**ug/L**		**SW846 6010B**	**10/24-10/25/02**	**FAA061CT**
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 10.2	
Manganese	**86.5**	**15.0**	**ug/L**		**SW846 6010B**	**10/24-10/25/02**	**FAA061CW**
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 0.51	
Nickel	ND	40.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061C1
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 1.4	
Potassium	**16200 J**	**5000**	**ug/L**	J 13	**SW846 6010B**	**10/24-10/25/02**	**FAA061C4**
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 50.0	
Selenium	ND	5.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061C7
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 3.1	
Silver	ND	10.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061DA
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 0.78	
Sodium	**187000**	**5000**	**ug/L**		**SW846 6010B**	**10/24-10/25/02**	**FAA061DE**
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 233	
Thallium	ND	10.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061DH
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 2.9	
Vanadium	ND	50.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA061DL
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 1.0	
Zinc	**1.7 B**	**20.0**	**ug/L**	J	**SW846 6010B**	**10/24-10/25/02**	**FAA061DP**
		Dilution Factor: 1			Analysis Time..: 13:12	MDL.....: 0.53	

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

SHAW E & I INC

Client Sample ID: CD3005

DISSOLVED Metals

Lot-Sample #...: H2J180210-002 **Matrix.....:** WATER
Date Sampled...: 10/17/02 **Date Received..:** 10/18/02

PARAMETER	RESULT	REPORTING LIMIT	UNITS	Reqd	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 2295324							
Mercury	ND	0.20	ug/L	U	SW846 7470A	10/23/02	FAA161DH
		Dilution Factor: 1			Analysis Time..: 12:28	MDL.....: 0.030	
Prep Batch #...: 2295402							
Aluminum	**69.8 B**	**200**	**ug/L**	J	**SW846 6010B**	**10/23-10/24/02**	**FAA161AA**
		Dilution Factor: 1			Analysis Time..: 13:28	MDL.....: 18.4	
Antimony	ND	60.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA161AE
		Dilution Factor: 1			Analysis Time..: 13:28	MDL.....: 3.1	
Arsenic	ND	10.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA161AH
		Dilution Factor: 1			Analysis Time..: 13:28	MDL.....: 2.7	
Barium	**270**	**200**	**ug/L**		**SW846 6010B**	**10/23-10/24/02**	**FAA161AL**
		Dilution Factor: 1			Analysis Time..: 13:28	MDL.....: 0.50	
Beryllium	ND	5.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA161AP
		Dilution Factor: 1			Analysis Time..: 13:28	MDL.....: 0.22	
Cadmium	ND	5.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA161AT
		Dilution Factor: 1			Analysis Time..: 13:28	MDL.....: 0.22	
Calcium	**198000**	**5000**	**ug/L**		**SW846 6010B**	**10/23-10/24/02**	**FAA161AW**
		Dilution Factor: 1			Analysis Time..: 13:28	MDL.....: 10.0	
Chromium	ND	10.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA161A1
		Dilution Factor: 1			Analysis Time..: 13:28	MDL.....: 1.0	
Cobalt	ND	50.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA161A4
		Dilution Factor: 1			Analysis Time..: 13:28	MDL.....: 1.0	
Copper	ND	25.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA161A7
		Dilution Factor: 1			Analysis Time..: 13:28	MDL.....: 1.0	
Iron	**157**	**100**	**ug/L**		**SW846 6010B**	**10/23-10/24/02**	**FAA161CA**
		Dilution Factor: 1			Analysis Time..: 13:28	MDL.....: 16.2	
Lead	ND	3.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA161CE
		Dilution Factor: 1			Analysis Time..: 13:28	MDL.....: 0.92	

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SHAW E & I INC

Client Sample ID: CD3005

DISSOLVED Metals

Lot-Sample #...: H2J180210-002 **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS Rw Qual	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Magnesium	**78600**	**5000**	**ug/L**	**SW846 6010B**	**10/23-10/24/02**	**FAA161CH**
		Dilution Factor: 1		Analysis Time..: 13:28	MDL.....: 10.2	
Manganese	**84.2**	**15.0**	**ug/L**	**SW846 6010B**	**10/23-10/24/02**	**FAA161CL**
		Dilution Factor: 1		Analysis Time..: 13:28	MDL.....: 0.51	
Nickel	ND	40.0	ug/L U	SW846 6010B	10/23-10/24/02	FAA161CP
		Dilution Factor: 1		Analysis Time..: 13:28	MDL.....: 1.4	
Potassium	**15900 J**	**5000**	**ug/L J 13**	**SW846 6010B**	**10/23-10/24/02**	**FAA161CT**
		Dilution Factor: 1		Analysis Time..: 13:28	MDL.....: 50.0	
Selenium	ND	5.0	ug/L U	SW846 6010B	10/23-10/24/02	FAA161CW
		Dilution Factor: 1		Analysis Time..: 13:28	MDL.....: 3.1	
Silver	ND	10.0	ug/L U	SW846 6010B	10/23-10/24/02	FAA161C1
		Dilution Factor: 1		Analysis Time..: 13:28	MDL.....: 0.78	
Sodium	**180000**	**5000**	**ug/L**	**SW846 6010B**	**10/23-10/24/02**	**FAA161C4**
		Dilution Factor: 1		Analysis Time..: 13:28	MDL.....: 233	
Thallium	ND	10.0	ug/L U	SW846 6010B	10/23-10/24/02	FAA161C7
		Dilution Factor: 1		Analysis Time..: 13:28	MDL.....: 2.9	
Vanadium	ND	50.0	ug/L U	SW846 6010B	10/23-10/24/02	FAA161DA
		Dilution Factor: 1		Analysis Time..: 13:28	MDL.....: 1.0	
Zinc	**1.5 B,J**	**20.0**	**ug/L B 6a**	**SW846 6010B**	**10/23-10/24/02**	**FAA161DE**
		Dilution Factor: 1		Analysis Time..: 13:28	MDL.....: 0.53	

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

SHAW E & I INC

Client Sample ID: CD3006

TOTAL Metals

Lot-Sample #...: H2J180210-004 **Matrix.....:** WATER
Date Sampled...: 10/17/02 **Date Received..:** 10/18/02

PARAMETER	RESULT	REPORTING LIMIT	UNITS	Rev Qual	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 2293115							
Mercury	ND	0.20	ug/L	U	SW846 7470A	10/20-10/21/02	FAA2A1A5
		Dilution Factor: 1			Analysis Time..: 12:31	MDL.....: 0.030	
Prep Batch #...: 2296221							
Aluminum	**80.1 B**	**200**	**ug/L**	J	**SW846 6010B**	**10/24-10/25/02**	**FAA2A1AE**
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 18.4	
Antimony	ND	60.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA2A1AF
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 3.1	
Arsenic	ND	10.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA2A1AG
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 2.7	
Barium	**275**	**200**	**ug/L**		**SW846 6010B**	**10/24-10/25/02**	**FAA2A1AH**
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 0.50	
Beryllium	ND	5.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA2A1AJ
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 0.22	
Cadmium	ND	5.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA2A1AK
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 0.22	
Calcium	**198000 J**	**5000**	**ug/L**		**SW846 6010B**	**10/24-10/25/02**	**FAA2A1AL**
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 10.0	
Chromium	ND	10.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA2A1AM
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 1.0	
Cobalt	ND	50.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA2A1AN
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 1.0	
Copper	ND	25.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA2A1AP
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 1.0	
Iron	**203**	**100**	**ug/L**		**SW846 6010B**	**10/24-10/25/02**	**FAA2A1AQ**
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 16.2	
Lead	ND	3.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA2A1AR
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 0.92	

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SHAW E & I INC

Client Sample ID: CD3006

TOTAL Metals

Lot-Sample #...: H2J180210-004 **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS Rev Qual		METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Magnesium	**79500**	**5000**	**ug/L**		**SW846 6010B**	**10/24-10/25/02**	**FAA2A1AT**
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 10.2	
Manganese	**85.2**	**15.0**	**ug/L**		**SW846 6010B**	**10/24-10/25/02**	**FAA2A1AU**
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 0.51	
Nickel	ND	40.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA2A1AV
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 1.4	
Potassium	**15900 J**	**5000**	**ug/L**	J, 13	**SW846 6010B**	**10/24-10/25/02**	**FAA2A1AW**
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 50.0	
Selenium	ND	5.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA2A1AX
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 3.1	
Silver	ND	10.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA2A1A0
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 0.78	
Sodium	**183000**	**5000**	**ug/L**		**SW846 6010B**	**10/24-10/25/02**	**FAA2A1A1**
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 233	
Thallium	**4.8 B,J**	**10.0**	**ug/L**	B, 6a	**SW846 6010B**	**10/24-10/25/02**	**FAA2A1A2**
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 2.9	
Vanadium	ND	50.0	ug/L	U	SW846 6010B	10/24-10/25/02	FAA2A1A3
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 1.0	
Zinc	**1.9 B**	**20.0**	**ug/L**	J	**SW846 6010B**	**10/24-10/25/02**	**FAA2A1A4**
		Dilution Factor: 1			Analysis Time..: 13:38	MDL.....: 0.53	

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

SHAW E & I INC

Client Sample ID: CD3006

DISSOLVED Metals

Lot-Sample #...: H2J180210-005 **Matrix.....:** WATER
Date Sampled...: 10/17/02 **Date Received..:** 10/18/02

PARAMETER	RESULT	REPORTING LIMIT	UNITS	Qual	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 2295324							
Mercury	ND	0.20	ug/L	U	SW846 7470A	10/23/02	FAA2C1A2
		Dilution Factor: 1			Analysis Time..: 12:37	MDL.....: 0.030	
Prep Batch #...: 2295402							
Aluminum	**82.3 B**	**200**	**ug/L**	J	**SW846 6010B**	**10/23-10/24/02**	**FAA2C1AE**
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 18.4	
Antimony	ND	60.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA2C1AF
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 3.1	
Arsenic	ND	10.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA2C1AG
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 2.7	
Barium	**279**	**200**	**ug/L**		**SW846 6010B**	**10/23-10/24/02**	**FAA2C1AH**
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 0.50	
Beryllium	ND	5.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA2C1AJ
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 0.22	
Cadmium	ND	5.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA2C1AK
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 0.22	
Calcium	**202000**	**5000**	**ug/L**		**SW846 6010B**	**10/23-10/24/02**	**FAA2C1AL**
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 10.0	
Chromium	ND	10.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA2C1AA
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 1.0	
Cobalt	ND	50.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA2C1AC
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 1.0	
Copper	ND	25.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA2C1AD
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 1.0	
Iron	**147**	**100**	**ug/L**		**SW846 6010B**	**10/23-10/24/02**	**FAA2C1AQ**
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 16.2	
Lead	ND	3.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA2C1AR
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 0.92	

(Continued on next page)

SHAW E & I INC

Client Sample ID: CD3006

DISSOLVED Metals

Lot-Sample #...: H2J180210-005 **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	Rev Qual	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Magnesium	**80500**	**5000**	**ug/L**		**SW846 6010B**	**10/23-10/24/02**	**FAA2C1AT**
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 10.2	
Manganese	**85.6**	**15.0**	**ug/L**		**SW846 6010B**	**10/23-10/24/02**	**FAA2C1AU**
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 0.51	
Nickel	ND	40.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA2C1AV
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 1.4	
Potassium	**16200 J**	**5000**	**ug/L**	J 13	**SW846 6010B**	**10/23-10/24/02**	**FAA2C1AW**
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 50.0	
Selenium	ND	5.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA2C1AX
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 3.1	
Silver	ND	10.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA2C1AM
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 0.78	
Sodium	**183000**	**5000**	**ug/L**		**SW846 6010B**	**10/23-10/24/02**	**FAA2C1AN**
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 233	
Thallium	**3.9 B,J**	**10.0**	**ug/L**	B,6a	**SW846 6010B**	**10/23-10/24/02**	**FAA2C1AP**
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 2.9	
Vanadium	ND	50.0	ug/L	U	SW846 6010B	10/23-10/24/02	FAA2C1A0
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 1.0	
Zinc	**1.2 B,J**	**20.0**	**ug/L**	B,6a	**SW846 6010B**	**10/23-10/24/02**	**FAA2C1A1**
		Dilution Factor: 1			Analysis Time..: 13:55	MDL.....: 0.53	

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

Accutest Laboratories

Report of Analysis

Client Sample ID: CD3007
Lab Sample ID: F15100-1A
Matrix: AQ - Groundwater Filtered
Project: PBOW

Date Sampled: 10/17/02
Date Received: 10/18/02
Percent Solids: n/a

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Aluminum	<200	200	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Antimony	-5.0	5.0	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Arsenic	<10	10	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Barium	281	200	ug/l	1	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Beryllium	<5.0	5.0	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Cadmium	<5.0	5.0	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Calcium	201000	1000	ug/l	1	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Chromium	<10	10	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Cobalt	<50	50	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Copper	<25	25	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Iron	432	300	ug/l	1	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Lead	<5.0	5.0	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Magnesium	80800	5000	ug/l	1	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Manganese	85.1	15	ug/l	1	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Mercury	<1.0	1.0	ug/l	1 U	10/29/02	10/30/02 M	SW846 7470A	SW846 7470A
Nickel	<40	40	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Potassium	22100	5000	ug/l	1 J B	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Selenium	<10	10	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Silver	<10	10	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Sodium	209000	5000	ug/l	1	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Thallium	<10	10	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Vanadium	<50	50	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Zinc	<20	20	ug/l	1 U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID: CD3007
Lab Sample ID: F15100-1
Matrix: AQ - Ground Water
Project: PBOW

Date Sampled: 10/17/02
Date Received: 10/18/02
Percent Solids: n/a

Metals Analysis

Analyte	Result	RL	Units	DF	Qual	Prep	Analyzed By	Method	Prep Method
Aluminum	<200	200	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Antimony	<5.0	5.0	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Arsenic	<10	10	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Barium	271	200	ug/l	1		10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Beryllium	<5.0	5.0	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Cadmium	<5.0	5.0	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Calcium	195000	1000	ug/l	1		10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Chromium	<10	10	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Cobalt	<50	50	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Copper	<25	25	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Iron	474	300	ug/l	1		10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Lead	<5.0	5.0	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Magnesium	78500	5000	ug/l	1		10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Manganese	82.7	15	ug/l	1		10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Mercury	<1.0	1.0	ug/l	1	U	10/29/02	10/30/02 M	SW846 7470A	SW846 7470A
Nickel	<40	40	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Potassium	21600	5000	ug/l	1	J 13	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Selenium	<10	10	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Silver	<10	10	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Sodium	203000	5000	ug/l	1		10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Thallium	<10	10	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Vanadium	<50	50	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A
Zinc	<20	20	ug/l	1	U	10/22/02	10/23/02 M	SW846 6010B	SW846 3010A

RL = Reporting Limit

DATA VALIDATION WORKSHEET
METALS

Reviewer: Kitchings **Date:** 12/17

Project: Plumbrook **SDG:** F15100 HZJ 180210 **Matrix/No. Samples** W -3

I. Sample Management			
A. Sample Preservation, Handling and Transport			
1. Have all samples been preserved with HNO_3 to pH <2?	Yes	No	N/A
2. Have sample temperatures been kept at 4° C (+ or - 2 ° C)?	Yes	No	N/A
3. Were all samples received in proper condition?	Yes	No	N/A
4. Were any qualifications required based on this information?	Yes	No	N/A
Cooler @ 3°, 3° C.			
B. Chain of Custody			
1. Were all samples properly recorded on COCs?	Yes	No	N/A
2. Were correct analyses performed on samples?	Yes	No	N/A
C. Holding Times			
1. Were samples analyzed within acceptable holding times?	Yes	No	N/A
2. Were any qualifications required based on this information?	Yes	No	N/A

SAMPLED		PREPPED/ANALYZED	
10/17	Total 5,6	10/24	10/25
	Diss. 5,6	10/23	10/24
	T 7	10/22	10/23
	D 7	10/22	10/23

II. Calibrations			
1. Were proper number of calibration standards used for each analytical instrument used?	Yes	No	N/A
2. Is the calibration correlation coefficient >or = 0.995 for each analytical instrument used?	Yes	No	N/A
3. Are initial and continuing calibration verification %R within 10% (+ or - 1%) acceptance window?	Yes	No	N/A
4. Are CRDL Standard %R within 10% (+ or - 1%) acceptance window?	Yes	No	N/A
5. Were any qualifications required based on this information?	Yes	No	N/A

Comments/Qualifications:

ICVs - ✓ CCVS.

Se ~~93.8 - 103.5~~ 93.8 - 103.5

all Se ✓ Hg -103.3 ✓

DATA VALIDATION WORKSHEET
METALS

Reviewer: Kitchings **Date:** 12/17

Project: Plumbrook **SDG:** F15100 HZJ 180 210 **Matrix/No. Samples** W-3

III.	Blanks			
	1. Are any analytes reported in laboratory prep or calibration blanks above the IDL?	Yes	No	N/A
	2. Are any analytes reported as negative values in laboratory prep or calibration blanks?	Yes	No	N/A
	3. Were any qualifications required based on this information?	Yes	No	N/A

Comments/Qualifications:

MB Ca @ 11.2 (I)
K @ 89.7
Tl @ 6.0
- 3006

K @ 88.8 (D)
Tl @ 5.1 - 3006
Zn @ 1.2 - 3005, 3006
B

IV.	ICP Interference Check Sample (ICS)			
	1. Were ICS samples run at the beginning and end of each sample analysis run?	Yes	No	N/A
	2. Are ICS %R within 80-120% acceptable control limits?	Yes	No	N/A
	3. Were any qualifications required based on this information?	Yes	No	N/A

Comments/Qualifications:

ICSA
96.4 - 110.2

SMA
93.2-111
Hg 110.0

V.	Blank Spike/Laboratory Control Sample (LCS)			
	1. Are all aqueous LCS %R within 80-120% control limits?	Yes	No	N/A
	2. Are all solid LCS %R within control limits established by EPA?	Yes	No	N/A
	3. Were any qualifications required based on this information?	Yes	No	N/A

Comments/Qualifications: Range of R's.

3005;6 LCS → 94-104 T
7 - LCS → 97.5-110.7 D — Hg - high but all smps @ ND
- no quals.

DATA VALIDATION WORKSHEET
METALS

Reviewer: Kitchings **Date:** 12/17

Project: Plumbrook **SDG:** F15100 HZJ180210 **Matrix/No. Samples** W-3

VI.	Duplicates			
	1. Were samples used for duplicate sample analysis identified as field blanks?	Yes	No	N/A
	2. For duplicate samples >5x CRDL, were RPDs within control limits of + or - 20% for water, or + or - 35% for soil?	Yes	No	N/A
	3. For duplicate samples <5x CRDL, were duplicate samples within control limit of + or - CRDL for water, or + or - 2xCRDL for soil?	Yes	No	N/A
	4. Were any qualifications required based on this information?	Yes	No	N/A
	Comments/Qualifications:			

VII.	Matrix Spike			
	1. Were samples used for matrix spike sample analysis identified as field blanks?	Yes	No	N/A
	2. Were spike recoveries within 75-125% limits (limits do not apply when original sample concentration exceeds spike concentration by a factor of 4?	Yes	No	N/A
	3. Were any qualifications required based on this information?	Yes	No	N/A
	Comments/Qualifications: MSD's - both sets w/in limits			

VIII.	ICP Serial Dilution			
	1. Were %Ds for ICP serial dilution samples within 10% for analytes with concentrations greater than 50x IDL?	Yes	No	N/A
	2. Were any qualifications required based on this information?	Yes	No	N/A
	Comments/Qualifications: ~~3225 = K~~ 5, 6 K-high. 7 K-high all samps @ "J".			

DATA VALIDATION WORKSHEET
METALS

Reviewer: Kitchings **Date:** 12/17

Project: Plumbrook **SDG:** F15100 H2J180210 **Matrix/No. Samples** w-3

IX. Sample Result Qualification Not Required For Level III Data Validation			
1. Were sample results reported by laboratory supported by raw data?	Yes	No	N/A
2. Were correct calculations used to determine sample results?	Yes	No	N/A
3. Were any qualifications required based on this information?	Yes	No	N/A
Comments/Qualifications: No raw data.			
X. Field QC			
1. Were any Field Duplicates associated with this SDG?	Yes	No	N/A
a. If Yes, were RPDs acceptable (~~50~~ 30% for water samples, ~~100~~ 50% for soil samples)?	Yes	No	N/A
2. Were any field blanks or equipment rinsates associated with this SDG?	Yes	No	N/A
a. If yes, were any analytes reported in samples >IDL?	Yes	No	N/A
b. Were any qualifications required based on this information?	Yes	No	N/A
Comments/Qualifications: FDs ~ all ND			
XI. Overall Assessment of Data			
1. Are there any specific concerns or limitations regarding the data in this SDG?	Yes	No	N/A
Comments/Qualifications:			

Attachment 2

FIS.00

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB10 17 02ACC

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Dave Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 833886.03010000
Required Report Date: 21 days

Sample Shipment Date: 10/17/02
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Maureen McMyler/865-560-5271
Carrier Waybill No.: 836531447542

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Maureen McMyler
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
CD3007	WATER	10/17/02 1035	1 - Amber	1 L	Cool	Explosives by 8830		
CD3007	WATER	10/17/02 1035	1 - HDPE	250 ~~500~~ mL	HNO3	Total Metals by 6010B/7470A		
CD3007	WATER	10/17/02 1035	1 - HDPE	250 ~~500~~ mL	HNO3	Dissolved Metals by 6010B/7470A		
CD3007	WATER	10/17/02 1035	2 - Amber	1 L	Cool	SVOCs by 8270C		
CD3007	WATER	10/17/02 1035	3 - Glass	40 mL	Cool	VOCs by 8260B		
CD5005	WATER	10/17/02	2 - Glass	40 mL	Cool	VOCs by 8260B		
	DKK 10/17/02							

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: David Kessler IT Corporation Date: 10/17/02 Time: 1800
1. Received by: [illegible] Date: 10/18/02 Time: 0900
2. Relinquished by: Date: Time:
2. Received by: Date: Time:
3. Relinquished by: Date: Time:
2. Received by: Date: Time:

Comments:

3.00

1-425180210

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB10/7/02STL K

PAGE 1 OF ~~2~~ 3

Project Name/No: PBOW
Sample Team Member: Dave Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 833886.03010000
Required Report Date: Normal

Sample Shipment Date: 10/17/02
Laboratory Destination: STL-Knoxville
Laboratory Contact: Jamie McKinney
Project Contact/Phone: Maureen McMyler/865-690-3211
Carrier Waybill No.: 836531447531

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Maureen McMyler
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
CD3005	WATER	10/17/02 1035	1 - Amber	1 L	Cool	Explosives by 8830		
			1 - HDPE	~~500~~ mL 250	HNO3	Total Metals by 6010B/7470A PH<2		
			1 - HDPE	~~500~~ mL 250	HNO3	Dissolved Metals by 6010B/7470A ↓		
			2 - Amber	1 L	Cool	SVOCs by 8270C		
			3 - Glass	40 mL	HCL	VOCs by 8260B		
			1 - HDPE	~~500~~ mL 1000	NaOH	Cyanide by 9010A PH>12	Cooler temp 3°C	
CD3005-MS	WATER	10/17/02 1035	1 - Amber	1 L	Cool	Explosives by 8830	Custody Seals intact	
			1 - HDPE	~~500~~ mL 250	HNO3	Total Metals by 6010B/7470A PH<2	Fed Ex #	
			1 - HDPE	~~500~~ mL 250	HNO3	Dissolved Metals by 6010B/7470A ↓	836531447531	
			2 - Amber	1 L	Cool	SVOCs by 8270C	FABS	10/18/02
			3 - Glass	40 mL	HCL	VOCs by 8260B		
			1 - HDPE	~~500~~ mL 1000	NaOH	Cyanide by 9010A PH>12		
CD3005-MSD	WATER	10/17/02 1035	1 - Amber	1 L	Cool	Explosives by 8830		
			1 - HDPE	~~500~~ mL 250	HNO3	Total Metals by 6010B/7470A PH<2		
			1 - HDPE	~~500~~ mL 250	HNO3	Dissolved Metals by 6010B/7470A ↓		
			2 - Amber	1 L	Cool	SVOCs by 8270C		
			3 - Glass	40 mL	HCL	VOCs by 8260B		
			1 - HDPE	~~500~~ mL 1000	NaOH	Cyanide by 9010A PH>12		
CD5004	WATER	10/17/02	2 - Glass	40 mL	Cool	VOCs by 8260B		

Special Instructions:

Possible Hazard Identification:
Non-haz: X Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler IT Corporation	Date: 10/17/02 Time: 1800	1. Received by: Steve B. Sharpe	Date: 10/18/02 Time: 08:45
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

H2J150210

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB10/17/02STL K 3

PAGE 2 OF 2

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
CD3006	WATER	10/17/02 1035	1 - Amber	1 L	Cool	Explosives by 8830		
			1 - HDPE	~~500~~ mL 250	HNO3	Total Metals by 6010B/7470A PH<2 PH>2 CBS 10/18/02		
			1 - HDPE	~~500~~ mL 250	HNO3	Dissolved Metals by 6010B/7470A PH<2		
			2 - Amber	1 L	Cool	SVOCs by 8270C		
			3 - Glass	40 mL	HCL	VOCs by 8260B		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010A~~ DKK		
CD3003	WATER	10/17/02 1510	1 - Amber	1 L	Cool	Explosives by 8830		
			1 - HDPE	~~500~~ mL 250	HNO3	Total Metals by 6010B/7470A CBS 10/18/02 PH>2	PH<2	
			1 - HDPE	~~500~~ mL 250	HNO3	Dissolved Metals by 6010B/7470A ↓	PH<2	
			2 - Amber	1 L	Cool	SVOCs by 8270C		
			3 - Glass	40 mL	HCL	VOCs by 8260B		
			1 - HDPE	~~500~~ mL 1000	NaOH	Cyanide by 9010A PH>12		
DKK 10/17/02	WATER		1 - Amber	1 L	Cool	Explosives by 8830		
			1 - HDPE	500 mL	HNO3	Total Metals by 6010B/7470A CBS PH<2		
			1 - HDPE	500 mL	HNO3	Dissolved Metals by 6010B/7470A 10/17/02 PH<2		
			2 - Amber	1 L	Cool	SVOCs by 8270C		
			3 - Glass	40 mL	HCL	VOCs by 8260B		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010A		
	WATER		1 - Amber	1 L	Cool	Explosives by 8830		
			1 - HDPE	500 mL	HNO3	Total Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	SVOCs by 8270C		
			3 - Glass	40 mL	HCL	VOCs by 8260B		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010A		
	WATER		1 - Amber	1 L	Cool	Explosives by 8830		
			1 - HDPE	500 mL	HNO3	Total Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	SVOCs by 8270C		
			3 - Glass	40 mL	HCL	VOCs by 8260B		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010A		

H2J180210

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB10 02STLK

PAGE 3 OF 3

Bill To: Accounting
IT Corporation

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
CD9001	WATER	10/17/02 1615	~~1 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8830~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~SVOCs by 8270C~~		
			~~3 - Glass~~	~~40 mL~~	~~HCL~~	~~VOCs by 8260B~~		
			1 - Amber	1 L	Cool	Corrosivity by 1110, Ignitability/Flashpoint by 1010; Reactive sulfide and cyanide by 7.3.3.2 and 7.3.4.2		
DKK	WATER		1 - Amber	1 L	Cool	Explosives by 8830		
			1 - HDPE	500 mL	HNO3	Total Metals by 6010B/7470A PH<2		
			2 - Amber	1 L	Cool	SVOCs by 8270C		
			3 - Glass	40 mL	HCL	VOCs by 8260B		
			1 - Amber	1 L	Cool	Corrosivity by 1110, Ignitability/Flashpoint by 1010; Reactive sulfide and cyanide by 7.3.3.2 and 7.3.4.2		

STL Cooler Receipt Form/Narrative Lot Number: H2J180210
North Canton Facility

Client: SHAW Project: Plum Brook Quote#:
Cooler Received on: 10/18/02 Opened on: 10/18/02 by: (Signature)

Fedx ☐ Client Drop Off ☐ UPS ☐ Airborne ☐ Other:
Cooler ☒ Safe ☐ Foam Box ☐ Client Cooler ☐ Other:
STL Shipper No#: STL Knoxville Cooler

1. Were custody seals on the outside of the cooler? Yes ☒ No ☐ Intact? Yes ☒ No ☐ NA ☐
   If YES, Quantity 1 Location SIDE
   Were the custody seals signed and dated? Yes ☒ No ☐ NA ☐
2. Shipper's packing slip attached to this form? Yes ☒ No ☐
3. Were custody papers included inside the cooler and relinquished? Yes ☒ No ☐
4. Did you sign the custody papers in the appropriate place? Yes ☒ No ☐
5. Packing material used:
Peanuts ☐ Bubble Wrap ☒ Vermiculite ☐ Foam ☐ None ☐ Other :
6. Cooler temperature upon receipt 2.8 °C (see back of form for multiple coolers/temp)
METHOD: Temp Vial ☒ Coolant & Sample ☐ Against Bottles ☐ IR ☐ ICE/H_2O Slurry ☐
COOLANT: Wet Ice ☒ Blue Ice ☐ Dry Ice ☐ Water ☐ None ☐
7. Did all bottles arrive in good condition (Unbroken)? Yes ☒ No ☐
8. Did all bottle labels and tags agree with the custody papers? Yes ☐ No ☒
9. Were samples at the correct pH? (record on back) Yes ☒ No ☐ NA ☐
10. Were correct bottles used for the tests indicated? Yes ☒ No ☐
11. Were air bubbles >6 mm in any VOA vials? Yes ☐ No ☒ NA ☐
12. Was a sufficient amount of sample sent in each bottle? Yes ☒ No ☐
Contacted PM K. Kuzio Date: 10/18/02 by: via Voice Mail ☐ Verbal ☒ Other ☐
Concerning: Missing Sample(s) noted Below!!

√	MACRO	MACRO
	1. CHAIN OF CUSTODY	
✓	SR1A	The chain of custody and sample bottles did not agree. The following discrepancies occurred COB CD3006 - 40mL, 1l, 500 mL = missing CD3005MS - missing 1l plastic
	2. SAMPLE CONDITION	
	SR2A	Sample(s) were received or requested after the recommended holding time had expired.
	SR2B	Sample(s) were received with insufficient volume.
	SR2C	Sample(s) were received in a broken container.
	3. SAMPLE PRESERVATION	
	SR3A	Sample(s) were further preserved in sample receiving to meet recommended pH level(s). *Nitric Acid Lot # 120701-HNO3; Sulfuric Acid Lot # 010802-H2SO4; Sodium Hydroxide Lot # 011102-NaOH; Hydrochloric Acid Lot # 020501-HCl; Sodium Hydroxide and Zinc Acetate Lot # 112801-CH3COO2ZN/NaOH*
	SR3B	Sample(s) were received with bubble > 6 mm in diameter (cc: PM)
	4. Other (see below or back)	

STL Cooler Receipt Form/Narrative
North Canton Facility

Client ID	pH	Date	Initials
CD3005 MSD	<2	10/18/02	[illegible]
3005MS	<2	10/18/02	[illegible]
3005	<2	10/18/02	[illegible]
3003	<2	10/18/02	[illegible]

Cooler	Temp	Method	Comments

Discrepancies Cont.

Macro Name:

Macro Name:

Macro Name:

Other Anomalies:

STL Cooler Receipt Form/Narrative
North Canton Facility

Lot Number: H2J18021

Client: STL Knox Project: _____ Quote#: _____
Cooler Received on: 10/19/02 Opened on: 10/19/02 by: Perry Burns (Signature)

Fedx ☒ Client Drop Off ☐ UPS ☐ Airborne ☐ Other: _____
Cooler ☒ Safe ☐ Foam Box ☐ Client Cooler ☐ Other: _____
STL Shipper No#: K598

1. Were custody seals on the outside of the cooler? Yes ☒ No ☐ Intact? Yes ☒ No ☐ NA ☐
   If YES, Quantity 2 Location over end
   Were the custody seals signed and dated? Yes ☒ No ☐ NA ☐
2. Shipper's packing slip attached to this form? Yes ☒ No ☐
3. Were custody papers included inside the cooler and relinquished? Yes ☒ No ☐
4. Did you sign the custody papers in the appropriate place? Yes ☒ No ☐
5. Packing material used:
   Peanuts ☐ Bubble Wrap ☒ Vermiculite ☐ Foam ☐ None ☐ Other: _____
6. Cooler temperature upon receipt 1.4 °C (see back of form for multiple coolers/temp)
   METHOD: Temp Vial ☐ Coolant & Sample ☐ Against Bottles ☐ IR ☒ ICE/H_2O Slurry ☐
   COOLANT: Wet Ice ☒ Blue Ice ☐ Dry Ice ☐ Water ☐ None ☐
7. Did all bottles arrive in good condition (Unbroken)? Yes ☒ No ☐
8. Did all bottle labels and tags agree with the custody papers? Yes ☒ No ☐
9. Were samples at the correct pH? (record on back) Yes ☐ No ☐ NA ☒
10. Were correct bottles used for the tests indicated? Yes ☒ No ☐
11. Were air bubbles >6 mm in any VOA vials? Yes ☐ No ☐ NA ☒
12. Was a sufficient amount of sample sent in each bottle? Yes ☒ No ☐

Contacted PM _____ Date: _____ by: _____ via Voice Mail ☐ Verbal ☐ Other ☐
Concerning: _____

√	MACRO	MACRO
1. CHAIN OF CUSTODY		
	SR1A	The chain of custody and sample bottles did not agree. The following discrepancies occurred _____
2. SAMPLE CONDITION		
	SR2A	Sample(s) _____ were received or requested after the recommended holding time had expired.
	SR2B	Sample(s) were received with insufficient volume.
	SR2C	Sample(s) were received in a broken container.
3. SAMPLE PRESERVATION		
	SR3A	Sample(s) _____ were further preserved in sample receiving to meet recommended pH level(s). *Nitric Acid Lot # 120701-HNO3; Sulfuric Acid Lot # 010802-H2SO4; Sodium Hydroxide Lot # 011102-NaOH; Hydrochloric Acid Lot # 020501-HCl; Sodium Hydroxide and Zinc Acetate Lot # 112801-CH3COO2ZN/NaOH*
	SR3B	Sample(s) _____ were received with bubble > 6 mm in diameter (cc: PM)
4. Other (see below or back)		

SEVERN TRENT STL

STL KNOXVILLE

SAMPLE LOG-IN (LOT SUMMARY) REVIEW CHECKLIST

CLIENT: Shaw PROJECT: PBOW Lot No.: H2J180210

TO BE COMPETED BY PROJECT MANAGER:

	YES	NO	NA
1. Client Documents (Request for Analysis/Chain of Custody):			
a. Was QuanTIMS lot number documented on all paperwork?	X		
b. Was RFA/COC signed upon receipt, including date/time?	X		
c. Is preservative check (pH) noted on RFA/COC?	X	X	
d. Is cooler temperature & custody seal condition noted on COC?		X	
2. Log-in (Lot Folder) Review:			
a. Do client IDs on Client Summaries match RFA/COC?	X		
b. Were tests/parameters assigned correctly?	X	X	
c. Were correct analytical and report due dates assigned?	X		
d. Has the correct fax due date been assigned to the lot?			X
e. Is the correct report format noted in the lot summary?	X		
f. Is percent moisture logged for samples requiring this analysis?			X
g. Are client assigned QC samples properly defined?		X	
3. Contract/Subcontract Review:			
a. Is there a contract number or PO for this work?	X		
b If the purchase order number is given, is it noted in Lot header?	X		
c. If samples were subcontracted, was copy of COC in folder?	X		
4. SDG Review:			
a. If SDG is required, is SDG form in Lot folder?			X
b Is SDG number noted in Lot header & sample comments?			X
c. If SDG is complete, has the due date been revised & marked closed?			X
5. Checklist Review:			
a. Has Sample Receipt Checklist been filled-out?	X		
b. Was there a CUR?			X
c. Were all issues resolved?			X

STL NC

LOT FOLDER REVIEWED BY: pm DATE: 10/24/02

A016R8.doc, 4/13/00

Delete MS/MSD for TDS, TSS, including
order log for duplicate (if lab hasn't created already) pm 10/24/02
BKS 10-25-02

Attachment 3

[USER_TEST_GROUP] = VOLATILES

LOCATION_CODE			PBOW H2J180210		PBOW H2J180210		PBOW-F15100	
SAMPLE_NO			CD3005		CD3006		CD3007	
SAMPLE_DATE			17-Oct-02		17-Oct-02		17-Oct-02	
SAMPLE_PURPOSE			REG		FD		FS	
Parameter	Units	Filtered	Result	Qual	Result	Qual	Result	Qual
Acetone	ug/L	N	1.6	J	2.6	J	7.3	J
Benzene	ug/L	N	0.15	J	0.14	J	2	U
Bromodichloromethane	ug/L	N	1	U	1	U	2	U
Bromoform	ug/L	N	1	U	1	U	2	U
Bromomethane	ug/L	N	2	U	2	U	5	U
Butanone, 2-	ug/L	N	5	U	5	U	10	U
Carbon disulfide	ug/L	N	1.3		0.49	J	1.8	J
Carbon tetrachloride	ug/L	N	1	U	1	U	2	U
Chlorobenzene	ug/L	N	1	U	1	U	2	U
Chloroethane	ug/L	N	2	U	2	U	5	U
Chloroform	ug/L	N	1	U	1	U	2	U
Chloromethane	ug/L	N	2	U	2	U	5	U
Dibromochloromethane	ug/L	N	1	U	1	U	2	U
Dichloroethane, 1,1-	ug/L	N	1	U	1	U	2	U
Dichloroethane, 1,2-	ug/L	N	1	U	1	U	2	U
Dichloroethene, 1,1-	ug/L	N	1	U	1	U	2	U
Dichloroethene, 1,2-	ug/L	N	1	U	1	U		
Dichloroethene, cis-1,2-	ug/L	N					2	U
Dichloroethene, trans-1,2-	ug/L	N					2	U
Dichloropropane, 1,2-	ug/L	N	1	U	1	U	2	U
Dichloropropene, cis-1,3-	ug/L	N	1	U	1	U	2	U
Dichloropropene, trans-1,3-	ug/L	N	1	U	1	U	2	U
Ethylbenzene	ug/L	N	1	U	1	U	2	U
Hexanone, 2-	ug/L	N	5	U	5	U	10	U
Methyl-2-pentanone, 4-	ug/L	N	5	U	5	U	10	U
Methylene chloride	ug/L	N	2	U	0.67	J	5	U
Styrene	ug/L	N	1	U	1	U	2	U
Tetrachloroethane, 1,1,2,2-	ug/L	N	1	U	1	U	2	U
Tetrachloroethene	ug/L	N	1	U	1	U	2	U
Toluene	ug/L	N	1	U	1	U	2	U
Trichloroethane, 1,1,1-	ug/L	N	1	U	1	U	2	U
Trichloroethane, 1,1,2-	ug/L	N	1	U	1	U	2	U
Trichloroethene	ug/L	N	1	U	1	U	2	U
Vinyl chloride	ug/L	N	1	U	1	U	1	U
Xylenes, total	ug/L	N	0.37	J	0.35	J	6	U

[USER_TEST_GROUP] = EXPLOSIVES

LOCATION_CODE			PBOW-H2J180210		PBOW-H2J180210		PBOW-F15100	
SAMPLE_NO			CD3005		CD3006		CD3007	
SAMPLE_DATE			17-Oct-02		17-Oct-02		17-Oct-02	
SAMPLE_PURPOSE			REG		FD		FS	
Parameter	Units	Filtered	Result	Qual	Result	Qual	Result	Qual
Amino-2,6-dinitrotoluene, 4-	ug/L	N	0.2	U	0.2	U	0.19	U
Amino-4,6-dinitrotoluene, 2-	ug/L	N	0.2	U	0.2	U	0.19	U
Dinitrobenzene, 1,3-	ug/L	N	0.2	U	0.2	U	0.19	U
Dinitrotoluene, 2,4-	ug/L	N	0.2	U	0.2	U	0.19	U
Dinitrotoluene, 2,6-	ug/L	N	0.2	U	0.2	U	0.19	U
HMX	ug/L	N	0.5	U	0.5	U	0.19	U
Nitrobenzene	ug/L	N	0.12	J	0.14	J	0.19	U
Nitrotoluene, 2-	ug/L	N	0.2	U	0.2	U	0.19	U
Nitrotoluene, 3-	ug/L	N	0.2	U	0.2	U	0.19	U
Nitrotoluene, 4-	ug/L	N	0.2	U	0.2	U	0.19	U
RDX	ug/L	N	0.5	U	0.5	U	0.19	U
Tetryl	ug/L	N	0.2	U	0.2	U	0.19	U
Trinitrobenzene, 1,3,5-	ug/L	N	0.2	U	0.2	U	0.19	U
Trinitrotoluene, 2,4,6-	ug/L	N	0.2	U	0.2	U	0.19	U

[USER_TEST_GROUP] = SEMIVOLATILES

LOCATION_CODE			PBOW-H2J180210		PBOW-H2J180210		PBOW-F15100	
SAMPLE_NO			CD3005		CD3006		CD3007	
SAMPLE_DATE			17-Oct-02		17-Oct-02		17-Oct-02	
SAMPLE_PURPOSE			REG		FD		FS	
Parameter	Units	Filtered	Result	Qual	Result	Qual	Result	Qual
Acenaphthene	ug/L	N	10	U	10	U	4.9	U
Acenaphthylene	ug/L	N	10	U	10	U	4.9	U
Anthracene	ug/L	N	10	U	10	U	4.9	U
Benzo(a)anthracene	ug/L	N	10	U	10	U	4.9	U
Benzo(a)pyrene	ug/L	N	10	U	10	U	4.9	U
Benzo(b)fluoranthene	ug/L	N	10	U	10	U	4.9	U
Benzo(ghi)perylene	ug/L	N	10	U	10	U	4.9	U
Benzo(k)fluoranthene	ug/L	N	10	U	10	U	4.9	U
Bis(2-chloroethoxy)methane	ug/L	N	10	U	10	U	4.9	U
Bis(2-chloroethyl)ether	ug/L	N	10	U	10	U	4.9	U
Bis(2-chloroisopropyl)ether	ug/L	N	10	U	10	U	4.9	U
Bis(2-ethylhexyl)phthalate	ug/L	N	10	U	10	U	4.9	U
Bromophenyl phenyl ether, 4-	ug/L	N	10	U	10	U	4.9	U
Butyl benzyl phthalate	ug/L	N	10	U	10	U	4.9	U
Carbazole	ug/L	N	10	U	10	U	4.9	U
Chloro-3-methylphenol, 4-	ug/L	N	10	U	10	U	4.9	U
Chloroaniline, 4-	ug/L	N	10	U	10	U	4.9	U
Chloronaphthalene, 2-	ug/L	N	10	U	10	U	4.9	U
Chlorophenol, 2-	ug/L	N	10	U	10	U	4.9	U
Chlorophenyl phenyl ether, 4-	ug/L	N	10	U	10	U	4.9	U
Chrysene	ug/L	N	10	U	10	U	4.9	U
Di-n-butyl phthalate	ug/L	N	10	U	10	U	4.9	U
Di-n-octyl phthalate	ug/L	N	10	U	10	U	4.9	U
Dibenz(a,h)anthracene	ug/L	N	10	U	10	U	4.9	U
Dibenzofuran	ug/L	N	10	U	10	U	4.9	U
Dichlorobenzene, 1,2-	ug/L	N	10	U	10	U	4.9	U
Dichlorobenzene, 1,3-	ug/L	N	10	U	10	U	4.9	U
Dichlorobenzene, 1,4-	ug/L	N	10	U	10	U	4.9	U
Dichlorobenzidine, 3,3'-	ug/L	N	50	U	50	U	9.7	U
Dichlorophenol, 2,4-	ug/L	N	10	U	10	U	4.9	U
Diethyl phthalate	ug/L	N	10	U	10	U	4.9	U
Dimethyl phthalate	ug/L	N	10	U	10	U	4.9	U
Dimethylphenol, 2,4-	ug/L	N	10	U	10	U	24	U
Dinitro-2-methylphenol, 4,6-	ug/L	N	50	U	50	U	9.7	U
Dinitrophenol, 2,4-	ug/L	N	50	U	50	U	24	U
Dinitrotoluene, 2,4-	ug/L	N	10	U	10	U	4.9	U
Dinitrotoluene, 2,6-	ug/L	N	10	U	10	U	4.9	U
Fluoranthene	ug/L	N	10	U	10	U	4.9	U
Fluorene	ug/L	N	10	U	10	U	4.9	U
Hexachlorobenzene	ug/L	N	10	U	10	U	4.9	U
Hexachlorobutadiene	ug/L	N	10	U	10	U	4.9	U

Hexachlorocyclopentadiene	ug/L	N	50 U	50 U	4.9 U
Hexachloroethane	ug/L	N	10 U	10 U	4.9 U
Indeno(1,2,3-cd)pyrene	ug/L	N	10 U	10 U	4.9 U
Isophorone	ug/L	N	10 U	10 U	4.9 U
Methylnaphthalene, 2-	ug/L	N	10 U	10 U	4.9 U
Methylphenol, 2-	ug/L	N	10 U	10 U	4.9 U
Methylphenol, 4-	ug/L	N	10 U	10 U	
Methylphenol, 3- and 4-	ug/L	N			4.9 U
n-Nitroso-di-n-propylamine	ug/L	N	10 U	10 U	4.9 U
n-Nitrosodiphenylamine	ug/L	N	10 U	10 U	4.9 U
Naphthalene	ug/L	N	10 U	10 U	4.9 U
Nitroaniline, 2-	ug/L	N	50 U	50 U	4.9 U
Nitroaniline, 3-	ug/L	N	50 U	50 U	4.9 U
Nitroaniline, 4-	ug/L	N	50 U	50 U	4.9 U
Nitrobenzene	ug/L	N	10 U	10 U	4.9 U
Nitrophenol, 2-	ug/L	N	10 U	10 U	4.9 U
Nitrophenol, 4-	ug/L	N	50 U	50 U	24 U
Pentachlorophenol	ug/L	N	50 U	50 U	24 U
Phenanthrene	ug/L	N	10 U	10 U	4.9 U
Phenol	ug/L	N	10 U	10 U	4.9 U
Pyrene	ug/L	N	10 U	10 U	4.9 U
Trichlorobenzene, 1,2,4-	ug/L	N	10 U	10 U	4.9 U
Trichlorophenol, 2,4,5-	ug/L	N	10 U	10 U	4.9 U
Trichlorophenol, 2,4,6-	ug/L	N	10 U	10 U	4.9 U

[USER_TEST_GROUP] = METALS

LOCATION_CODE			PBOW-H2J180210		PBOW-H2J180210		PBOW-F15100	
SAMPLE_NO			CD3005		CD3006		CD3007	
SAMPLE_DATE			17-Oct-02		17-Oct-02		17-Oct-02	
SAMPLE_PURPOSE			REG		FD		FS	
Parameter	Units	Filtered	Result	Qual	Result	Qual	Result	Qual
Aluminum	ug/L	N	79.7	B	80.1	B	200	U
Aluminum	ug/L	Y	69.8	B	82.3	B	200	U
Antimony	ug/L	N	60	U	60	U	5	U
Antimony	ug/L	Y	60	U	60	U	5	U
Arsenic	ug/L	N	10	U	10	U	10	U
Arsenic	ug/L	Y	10	U	10	U	10	U
Barium	ug/L	N	277		275		281	
Barium	ug/L	Y	270		279		271	
Beryllium	ug/L	N	5	U	5	U	5	U
Beryllium	ug/L	Y	5	U	5	U	5	U
Cadmium	ug/L	N	5	U	5	U	5	U
Cadmium	ug/L	Y	5	U	5	U	5	U
Calcium	ug/L	N	200000	J	202000	J	201000	
Calcium	ug/L	Y	198000		198000		195000	
Chromium	ug/L	N	10	U	10	U	10	U
Chromium	ug/L	Y	10	U	10	U	10	U
Cobalt	ug/L	N	50	U	50	U	50	U
Cobalt	ug/L	Y	50	U	50	U	50	U
Copper	ug/L	N	25	U	25	U	25	U
Copper	ug/L	Y	25	U	25	U	25	U
Iron	ug/L	N	207		203		432	
Iron	ug/L	Y	157		147		474	
Lead	ug/L	N	3	U	3	U	5	U
Lead	ug/L	Y	3	U	3	U	5	U
Magnesium	ug/L	N	80200		79500		80800	
Magnesium	ug/L	Y	78600		80500		78500	
Manganese	ug/L	N	86.5		85.2		85.1	
Manganese	ug/L	Y	84.2		85.6		82.7	
Mercury	ug/L	N	0.2	U	0.2	U	1	U
Mercury	ug/L	Y	0.2	U	0.2	U	1	U
Nickel	ug/L	N	40	U	40	U	40	U
Nickel	ug/L	Y	40	U	40	U	40	U
Potassium	ug/L	N	16200	J	15900	J	22100	
Potassium	ug/L	Y	15900	J	16200	J	21600	
Selenium	ug/L	N	5	U	5	U	10	U
Selenium	ug/L	Y	5	U	5	U	10	U
Silver	ug/L	N	10	U	10	U	10	U
Silver	ug/L	Y	10	U	10	U	10	U
Sodium	ug/L	N	187000		183000		209000	
Sodium	ug/L	Y	180000		183000		203000	
Thallium	ug/L	N	10	U	4.8	BJ	10	U

Thallium	ug/L	Y	10 U	3.9 BJ	10 U
Vanadium	ug/L	N	50 U	50 U	50 U
Vanadium	ug/L	Y	50 U	50 U	50 U
Zinc	ug/L	N	1.7 B	1.9 B	20 U
Zinc	ug/L	Y	1.5 BJ	1.2 BJ	20 U